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A NEGLECTED FIELD IN EDUCATION.

BY C. R. NARAYANA RAO, M.A.

EDUCATIONAL inspection is perhaps the one subject which has not received any great measure of attention from the educational writers and critics. This comparative neglect is due partly to its technique not being understood and partly to its importance not being recognised. At any rate in India, the inspecting agency is a long way behind the times, for none of the changes which have been recently introduced into the theory and practice of teaching have produced a corresponding reaction in the other department. No sensible man holds the view that a single teacher, whatever his attainments, can successfully teach more than two out of the nine or ten subjects embraced in a high school curriculum; but the Inspector of schools, who is only drafted from the tutorial line, is expected to review satisfactorily both the work of teachers and the achievements of pupils.

The school inspector is rightly looked upon in the scheme of things somewhat in the nature of a supreme pedogogical dictator and the primary objects of school inspection include the discovering of the multifarious needs of the different institutions comprised within his jurisdiction, a close examination of the facts of school life with a view to estimate their worth, systematisation of such facts derived from the several schools so as to arrive at a basis for guiding their progress and finally as a result of a comparative study of the school statistics to develop certain standards for controlling and co-ordinating the educational activities of the province. It is obvious that emphasis at least on some of these points will vary according to the conditions of the award of grants-in-aid, *i.e.*, the policy of Government in the matter of award, will be determined either by the requirements of the school in order to bring it up to a certain standard or by the educational merits of the school at the time of inspection, or by any other special feature for which the school may be distinguished. In a sense this class of work is at once the cause and effect of the educational policy of the Government. A hide-bound programme of this description leaves hardly any time for the consideration of the individual possibilities of schools or the broader aspects of their life. What is regarded as the formal or mechanical part of inspection will bear a new interpretation altogether if it were viewed in the light of what pupils did outside the school, their games, pastimes and home work, their physical conditions, their general reading, the unity of curriculum or its suitability to local circumstances and the relation of school to social and industrial opportunities. In the next stage, if there is sufficient zeal and insight, interest ought to be developed by the inspector in problems relating to the comparative economy of the different educational processes based on the various

hypotheses derived from the theories of psychology.

Nothing is easier than to class these sentiments under the category of counsels of perfection and perhaps they will remain so till a merciful Providence gives us more courage in thinking and acting. One might ask why there should be so much agitation in the educational world in England at present, while there is comparatively less talk not only in the enemy country but in France and America. With all her liberal instincts, England has been most conservative in her educational institutions, "which stand for an attempt at moral unity based partly on individual experience, partly on inherited traditions of various social groups and partly on administrative organization." Obviously, the British view of education is the most complex and in India we have only an inferior edition of this view, which is as difficult to define as it is liable to ineffective compromise. In British India the governance of education is not after the American model and the Fendatory states select generally their immediate neighbours for their educational models.

It is somewhat unfortunate that our educational ambition should be so circumscribed that we continue to derive comfort in mistaking the establishment of more schools and perpetuating a mouldered type of instruction in them, for "progress in education." Educational progress involves the addition, by conquest of fresh facts as a result of investigation, to the stock of knowledge on education and is not to be confused with the extension of primary instruction. Growth by accretion is certainly different from growth by development. The latter is characteristic of the Organic world, while the former, of the mineral kingdom. In its evolutional history Indian education is still in the throes of crossing that barrier which separates empiricism from science, and it will be therefore no wonder if the conception of the duties of the inspectorate as set forth in an earlier paragraph, should be treated as outside the range of practical politics. I shall, however, proceed to deal briefly with some of the phases of the latest methods of school inspection in general as obtaining in the continental countries.*

So long as the individual examination system prevailed, the inspector constituted himslf into a school critic and the teacher actually would hoodwink him in exerting to secure good results. The whole process according to this system would reduce itself into a game of manœuvres, and the relations would be far from cordial. Chiefly under the influence of the Education Act of 1902, this method of testing the attainments of single pupils by oral questions, was replaced by one of focussing the attention on the aims and methods of the teacher. Very often this is understood to mean that the inspector is to form a judgment of the educational values of the school by listening to a few lessons given by the teachers to the different classes in their several subjects, and himself remain in a state of masterly inactivity: but the spirit of the Act of 1902 demands that the Inspector should pay greater attention to ideals. He is to stop and talk with teachers and head-masters more than listen to lessons with a view to discover their ideas about their work, any reforms introduced or contemplated; he may saunter apparently without any method, but is expected to gather information with which to estimate the influence of the school on the children; he has to teach at least some of the classes in subjects in which he is especially interested, not only by way of setting a model to the teacher but more with a view to discover the diligence and resourcefulness of the scholars which intelligent questioning reveals; he is to take special note of the way in which pupils get

* The reader is referred to Occasional Reports No. 7—Methods of School Inspection in England.—by H. G. Wyatt, for fuller information than this article affords.

ready for the written tests, their readiness in expressing themselves orally on work done, as exhibiting the method of instruction. But what he is really doing in all this varied and somewhat erratic procedure is not so much to discover the attainments of the pupils in any subject or to gather for himself material for report on the school as really to find out what those scholars are gaining from the school in a broader educational stand-point, in power, for example, to deal intelligently and keenly with the ordinary demands of their every day life.

Any change in the method of inspection must also affect the demands made on the inspectorate. The Education Act of 1902 made it imperative on the Educational Board to look in the inspector for a far deeper knowledge of educational aims and methods and greater ability to consider the value of each school in relation to its environment; and "while he was free to take any initiative or conduct experiment, he was expected to secure that personal co-ordination in principle and practice amongst his colleagues, if the unity of the different grades of instruction is to be maintained or economy of effort secured in the realisation of ideals." That special training is required for the proper performance of these complex functions is uudisputed. The argument that one need not be a practical teacher to appraise a school is only on a par with that other theory that any mind is good to deal with educational problems. If by appraisement we mean the formation of an opinion on the school as a place of instruction, then there is force in the proposition that the more ignorant one is about the school the more near to the truth will be one's judgment; but in practice appraisement involves an estimate of the endeavours of the school to attain to perfection. To have lived the teaching life is the surest way of arriving at a correct understanding. Unless the Inspector possesses sufficient driving power, which is another name for personality and training, he becomes a confirmed anochronism in the new system of inspection. The profoundest difference between teaching and other professions is that the material dealt with in the former and machinery employed are less "material and less mechanical" and the whole ohject of the educational endeavours is the making of humanity.

In the very nature of the circumstances the inspector is the last person to watch the school in its normal working condition, for his presence introduces a new atmosphere besides producing a great deal of excitement. The question is whether he can avoid disturbance, if not, what kind of disturbance will best serve his purpose. If it is observational inspection, the clever teacher will give a show lesson on some favourite subject, and, if examination inspection, the dodge will be to cram the pupils on anticipated questions. Either way the purpose of inspection is defeated. The element of disturbance is reduced to a minimum when the inspector proceeds to tackle ideas and ideals instead of either the pupils or the teacher and the disturbance becomes emulation when the teacher and inspector understand that they are "equally concerned to co-operate in furthering a common cause;—to awaken intelligence and train ability in the scholars." The recognition of this principle was the cause in 1905, of the cessation of instruction regarding the precedure and inspectors possessing the power of initiative welcomed the freedom. The work apportioned to the deputies, the actual class room procedure, the method which the inspecting officer adopts for measuring the instruction in each case, must necessarily vary with the individual but in no case should the officer go straight to test the pupils' attainments or the teachers' methods. The investigating of both, however useful they may be for an estimation of the school's work,—especially of the intelligence that is shown in combining the development of a common school spirit and policy with freedom of action in the

individual teacher and in choice, and adaptation to circumstances or curricula, syllabuses and lesson,—will have to be handled very tactfully. The first step is therefore "to adopt an attitude of learner,—the inspector wishing to find out what the teaching is all about, though, of course, an intelligent teacher will be anxious to avail himself of the wider experience of the inspector, in suggesting further improvements, or fresh ideas." The inquiry into method and aims of lesson will therefore take the form of a discussion in which the inspector will divest himself of all critical spirit. If any portion of the work of the teacher is to be criticised at all, then criticism ought to take the form of suggestion or description of some plan or devise found successful elsewhere and in which the teacher would naturally be interested.

The written work given at inspection of this character should be assessed, partly by the teacher whose working will indicate the standard expected of the class, and the bulk of work will have to be carried home where time admits the analysis of papers for ascertaining the prevalent merits and defects.

The record of class lessons or what is called "Rough Notes" is like a torch; the more you shake it the more light it sheds on school activities. A careful inspection of these books will enable the inspector to apply a common measure to the pupils' attainments, to find out how far the teacher has secured the attention of his class, the individual merits in special subjects, how far the pupil has been led to think out for himself, any special methods introduced by the teacher, his standard of teaching and several other useful items of information. In fact an examination of these books will cause no disturbance and is resorted to by the inspectors as a better form of meeting their ends. An annual detailed inspection of the principles, methods and organization of the school life is out of place and in fact even the ordinary visits of the officers need not be repeated every year provided the authorities are satisfied that there will be no dereliction of duty on the part of the teacher. The general organization of the school, the system of classification, of distribution of work amongst the staff, the arrangement of time-table and of syllabuses of studies, the machinery of discipline, the influence of the school and the special aptitudes of the staff would be items of discussion with the Headmaster.

Though it ought to be possible to obtain a just idea of the school in all its varied aspects within the time given, to attempt to write off a report straight after the first visit is ridiculous. The first inspection can only open out lines of enquiry and in nine cases out of ten "the inspector may come away doubtful as regards any point of excellence or defects either in the methods of teaching or organization." If the official estimate of a school ought to be a reliable record, the officer should repeat his visits before making up his mind. He first prepares the way for the second and the opinions formed in the first visit will regulate the procedure of the second, besides enabling him to get a deeper insight into the secrets of success or failure of the particular institution. Apart from securing greater justice of estimate, the repetition of inspection such as outlined above and the comparing of notes by two or more officers about the results of inspections of the same school will secure continuity which is so essential to progress. Continuity of inspection means continuity of spirit in the school's work; the deputy follows up the work of the chief and progress is bound to proceed on a given line. The advocacy of strict continuity does not mean the extinction of the individuality of the school, but is only a devise for its promotion along any bent the school may have discovered. The inspector if he knows his job will suspect the work of his subordinate staff aiming at an even level of excellence of all the schools. For that is the surest indication of either slackness or

dulness. Just as the whole purpose of education is to foster and encourage the original differences among children, a carefully planned inspection will seek for special characteristics of the school, and deepen such differentiating qualities.

Staff meetings, conferences of inspectors and invitations to the Head-mastars and leading citizens to meet and discuss the local educational wants with the inspecting agency are useful *only* when there is a *purpose* behind them. There is ahsolutely no point in calling a staff meeting for discussing any comment relating, say to a particular class, or subject or teacher, but essential when the policy of the school has to be altered, or any new method of instruction is planned, or any subject that affects or concerns the school as a whole. It will certainly do us good if we have some correct notions about when and how to conduct at least educational conferences among the inspectors,—say in charge of the Anglo-Vernacular and Village elementary schools. The chief inspector in charge of the district carefully divides his jurisdiction into several smaller areas each typifying certain local characteristics in reference to the pursuits of the people. Each area will be under the observation of two or more subordinate officers at once on the lines and principles laid down by the chief for a period of three months. The district inspector visits each area himself maintaining his own notes and even may hold informal meetings at which the notes of the subordinates may be discussed. The batches of these assistant inspecting staff will then exchange their areas particularly with a view to get the groups of schools examined by different sets of officers. At the end of the year or two years when particularly the subordinate staff will have gone over the entire district, a conference is called at the head-quarters at which the head-masters and principal citizens directly or indirectly connected with the schools may be invited to attend. The deliberations will take the form of a discussion of notes on the several areas maintained by the different sets of officers whose view-points about any particular group of schools must necessarily vary. The head-masters and the representatives of the governing body may supplement the discussion as points arise which may need deliberate treatment. Opinions and impressions instead of being delivered *ex cathedra* will be given with an absolute sense of responsibility based on varied experience and can be supported by facts of observation. The chief inspector who will preside at these conferences will in summarising the deliberations point out where his own observations agree with or differ from those of his assistants, lay down the principles and plan of the educational campaign to be opened and carried out in his district for the next three years. In posting his subordinates to auy particular area to carry out the new policy, the district officer will pay attention to the special aptitudes which his subordinates may have displayed in examining that portion of the district. The head-masters know what is expected of their staff and the governing authorities know what will happen in their schools in the next three years.

Seeking advice should not be *infra dig.* There are few inspectors, I should think, who are without some special subject or aspect of work in which they are proficient, though all round excellence is a myth. For example, if any inspector is not satisfied with the science teaching in any large school in his jurisdiction, he may seek the advice of his scientific neighbour; or if school gardens or special courses in rural subjects have been lately started in his district, he may ask some more proficient colleague to see one or two schools with him and assist him with advice. We have not come to the point in the advance of education in our State, at which it would need the appointment of specialist inspectors. It would be an excellent arrangement if we could get the

district inspectors to see one another's work.

All local efforts get quickened by fresh ideas poured from outside, if they are not in the habit of originating spontaneously. One of the means of acquainting the inspecting staff with what is going on elsewhere is through the publication by the divisional inspectors of summaries of the inspectional reports of countries after which our own educational models are fashioned. It may even be necessary to depute occasionally one or more of the promising young inspectors to foreign countries to make special study of the methods of inspection and systems of education.

Other subjects like the relation between the elementary and secondary grades of inspection, reports and minutes, educational and medical inspection, administrative duties, and the inspection of secondary schools, which are the functions of the specialist inspectors must stand over for the present.

In India education has not reached any stage of specialisation and consequently the inspection is not divided into branches like technical, medical and so forth all separately staffed. However, two grades of the general branch are distinguished, the elementary and the secondary. The question therefore of the opportunities and arrangements for co-operating between officers in these branches is well worth consideration, for an ideal educational system ought to preserve continuity of policy in the different grades of instruction. At present the relation between the divisional and district officers and their subordinates is purely official and not educational and meetings in which they discuss common problems are few and incidental. The attention of each officer is naturally centered upon his own grade of school, and in the nature of things, it may not be quite possible, for example, the divisional inspector to visit elementary schools, though as a point of principle he should. The problem is partly one of time; and indeed some of the conferences that do take place among the officers of the secondary and elementary grades do not go far enough, chiefly because they have not had any common subject under investigation in their respective jurisdictions and therefore the deliberations become general and diffuse. The co-ordination of syallabuses in an elementary and secondary school; the age at which the foreign language is to begin; the reconciliation of the difference in method and subjects of teaching in the vernacular schools for the sake of prospective secondary scholars and those that would drop; the amount and kind of out-of-school work; the arrangement of examinatiou courses; the provision of buildings, equipment and training of staff are among the category of subjects that will provide common interest. In our State the divisional iuspectors are now in charge of the normal institutions. The elementary school inspectors would profit immensely if, in auy particular area, they are brought into closer and regular association with the inspection of the training institutions which prepare teachers for the schools under their control. If a scheme could be devised by which a certain proportion of the elementary iuspectors would be enabled to revise their own training whenever they are thus associated, their work of inspection of the training institutions will be confined to visiting the practising section or watching a model lesson in progress and otherwise familiarise themselves with any improved method of instruction that these schools may have introduced or which they may reasonably expect to be carried out in the schools in their charge. Thus whereas the divisional inspector will have the opportunity of going into the details of the life of such institutions, his subordinate staff will by their association not only help him as official examiners of written work, but chiefly watch the essentials of training. A scheme such as this is wanting at present.

It is too premature at present to talk of specialist inspector and the relation of the medical inspectional staff and educational officers.

The inspector, whatever his grade may be, is looked upon as an apostle of progress in education in its true sense and is primarily "answerable to the wider public for his stewardship." The pressure of administrative and multifarious other work hardly leaves him time to enter upon duties other than those of the inspector as such. But there are not wanting men in the inspectorate who hold that the influencing or educating of public opinion is something "more than a work of supererogation on their part." In common with the head-masters they ought to look out for opportunities of familarising the public mind with the ideals and position of schools at the present day and with its own obligations and responsibilities towards them. If the parents do not or would not come to the schools, it is far easier to take these schools to the parents and the whole thing depends on the degree of confidence that the head-master and the inspecting agency enjoy and the influence they can exercise among the people amidst whom they work.

It is commonly held that the writing of reports is a dreary task and is certainly so when they are, as annually, written for their own sake. Since the reforms of 1905, the substitution of "inspection" for "examination" and of visits without notice instead of the annual visitations and the award of grants not being dependent on the yearly estimates of the schools' "progress", there has been no adminstrative necessity of "succeeding a visit with a report, except a comprehensive, triennial report" after the conference such as was sketched in the beginning of this article. Unless the inspection is a detailed one, the report has to be very brief and avoid all attempts to cover each of the recognised number of topics pertaining to a comprehensive estimate of the worth of the school in all its main branches. Usually two classes of reports are contemplated by the inspectors of the English schools; firstly the report which conveys at more or less length a summary impression of the condition of the schools as a whole, particularising where it is considered worth while some special feature in the schools life,—a class or subject, anew plan of teaching or apparatus, the premises or organization. Secondly, a report confined to a specific point for a specific purpose, for example, the provision for the teaching of a new subject since the last inspection, the addition of a new laboratory or innovation in the curriculum. The prevailing defect of most reports is that they are full of destructive criticism; this is as much to be deprecated as writing doctrinaire views. No one knows more intimately the social difficulties and circumstances attending a school than the head-master and that inspector must be a very bold and confident person if after a single visit or at most two in the year, proceeds to criticise outright or is profuse in suggestions for improvement. On the other hand, as a trained observer of the problems and practices that obtain in a variety of schools, the inspector would be wanting in capacity if he did not collect ideas, principles or expedients likely to be applicable in different sets of circumstances. Once the inspector is in possession of facts based on personal investigation, he cannot resist the temptation of analysing them. Analysis of facts is the basis of science. Take for example that much abused word "Progress." A school has not progressed if the attendance in the different classes becomes larger or there are more passes in a particular year. I should regard that school to have "progressed" if it has succeeded in producing the same measure of intelligence in the pupils of a certain class in any particular subject, say by devoting now two hours in a week, that it used to produce formerly by setting apart three or even four hours. It should be borne in mind that higher results can never be obtained by pressure. That extra hour or two may be rationally devoted for instruction in incidental subjects. This is progress and not overburdening the syllabus irrationally, which would certainly be the case if we went on adding new subjects just with a desire to be thought of well by our neighbours. The difference between the two processes is the difference between science and empiricism. A question ...

the relation between the time devoted to a subject and the results obtained can be treated scientifically only by the inspector who has facts in his possession. These facts are the by-products of reports and statements.

Unless the inspector is a living scientist or has the scientific habit of mind, he is simply a child in the matter of appraising the work in different subjects of the high school. A full-dress inspection of the High School is generally the rule, and the assistants who help the divisional inspector must have had professional training and must have specialised at least in one or two subjects of the High School studies. When an inspector and say three of his assistants settle upon a school, the only way in which each of these officers with special subjects or lines of enquiry can avoid intermittent vacant intervals is to give up the day's time-table and allow the officers to take the class in their own subjects. With a little pre-arrangement the whole work should proceed without the slightest distrubance. The actual class room procedure in inspection differs somewhat from that of the inspector in elementary schools. In the latter case the tendency is to give greater attention to watching the lessons more with a view to discover the teacher's resource or adaptability whereas in the High Schools, the purpose is to push enquiry deeper into the comparative methods, hypotheses and principle. Printed schedules of enquiry with headings and sub-headings are useful within certain limits in the case of the higher institutions and are out of place in an elementary school, for it is of infinitely greater importance that a searching investigation is made into every aspect of the High School's activity, its organization, premises, equipment, time-table, curriculum, training and special aptitudes of staff, and so forth. It is almost fatal to the science of inspection if the questionaire is of the fixed type; indeed some very excellent things become wooden the moment they are officialised. The printed schedule ought to be more a help to the memory for anything that distinguished one school from another will strike even the most casual observer and the greater part of the report must hinge on this distinctive character. Occasionally it may be of advantage to have the school in certain branches inspected by specialists assisted by the regular officers.

NOTE ON INDUSTRIAL EDUCATION IN UNITED PROVINCES.

By M. V. Kibe,

Excise Minister, Indore.

IN August and September last I made a tour in the U. P. to visit industrial institutions and concerns. Of all the Provincial British Indian Governments, the U. P. Government seems to have been anxious to impart industrial instruction to classes which have been accustomed to it. Bombay was perhaps the first in the field to establish institutions for giving technical education. The initiative was taken by its successful business men. Commensurate with their wealth, they created magnificent buildings and lavishly equipped institutions. The latter took their Western prototypes for their model and resulted in being something above the heads of the people and the times.

It is only in recent years that the British Indian Governments have awakened to the needs of India and the strenuous times of the War have led them to see the folly of neglecting the industries of the country. The defects in the attempts already made have to a large extent been discovered and attempts have been already begun to rectify them. They are yet few but in course of time they bid fair to be adequate.

The department of Industries in the United Provinces has so far started six institutions for teaching various kinds of industries and giving technical knowledge in mechanical subjects. In locating them cognisance has been taken of the fact that an institution teaching a subject has been established in a locality where the indigenous artisan class is devoted to that branch of industry. The Industrial Exhibition held at Allahabad in 1910 discovered the

numerous indigenous industries scattered over the Province, together with their extent and strength, and since then the policy of establishing the institutions referred to has been initiated.

There have been lately started at Cawnpore two institutions of the kind. It being the centre of Cotton Mills and leather factories the institutions teach subjects which are germane to them. A school for imparting instruction in dyeing and printing has been started under the Principalship of an Indian Scientist trained in Europe. There are two classes of students. One class of them has received some training of science in English, the other one is recruited from the professional men and families. This feature is common to all the institutions started by the department. To men with English education both theoretical and practical training is given; the training of the latter class is almost entirely practical. Another common feature is that the various local authorities in the Province provide scholarships to students. Students from Native States are admitted to a small extent. All these institutions have boarding houses attached to them. The school is handicapped for want of machinery for starting Calico Printing, for which some places in the U. P. are known.

Contiguous to it is the school for leather works. Here shoe-making, box-making and making of various kinds of leather things is taught. Instruction is given in English and the Vernacular according to the capacities of the classes. The instructions they receive here will fit them for starting factories on a small scale on their own account.

Lucknow is the cantre for Iron Works and artware established since the days of the Nawabs. A school for mechanical engineering is established here. There are in it at present about 150 students of all grades of education. A department of motor mechanics is also added. The aim is not to turn out learned mechanical engineers, but practical mistrees. Arrangements are made to supplement the education received here by attaching scholars to Mills and other factories before passing them out.

The other Government institution is a school of arts and crafts. In it printing and engraving, simple, photographic and in colours, smithy—gold and silver, toys making, furniture making and such subjects are taught. Here too there are about 150 students. Located in Nawabi buildings, amidst artistic surroundings, this school creates an atmosphere not to be had every where. It is however capable of expansion.

Benares is the centre for cloth making, especially gold cloth. A school of teaching weaving by means of improved looms is located here. The school is maintained partly as a commercial concern. A drawback here appears to be that no attempt is made to teach the art of gold clothmaking.

As a means of encouraging the various other manpower industries, a store for the sale of wares has been established at Cawnpore. It is located in a building in the Bazaar and is called the Exhibition of Village Industries.

Laudable as the attempts are, they fall far short of the requirements which were revealed by the Exhibition. There are several arts, such as the hand paper making industry of Muttra, which requires investigation and and encouragement. There is no doubt that it is the aim of the newly created Industries Department.

ESSENTIALS OF ECONOMIC PROGRESS.

BY THE EDITOR.

WITH this number we commence the fifth volume of our *Journal*. During the past four years, we have had the support and assistance of a large number of writers, both within and outside the State. With this aid we have been able to do as much as may be possible for a *Journal* of this kind in attracting attention to the importance of the subject of the economic development of the country. This work has been described in recent times as *the* work before us. The war has shown in many ways how far behind we are in the scale of nations in this particular matter. The work before us requires leaders of high grade type who will give their whole-hearted attention to it. Hitherto the Government service has drawn to itself the best intellect of the country. It is time that a portion of this talent is diverted into this new channel of activities. The coming years will show how much this divertion is necessary. The western world is all for re-construction on a new basis to suit the needs of to-day. We, in India, have still had no men to do the simple things that are necessary to re-adapt the old condittons in which we have found ourselves, owing to the annihilation of time and distance by the inland and occan telegraphs, the railway and the steam ship. Shall we move with the times or be left in the march? That is the question we have to answer to-day.

The close of the war brings us to a new epoch. This epoch will be marked by tremendous competition in the Western world, which will spreaad into the East, of which India forms a geat part. Now what is the duty of this country in regard to this matter in the coming years? The several Governments in India are anxious for in advance in the commercial and industrial development in their own areas. They have already, in certain cases, commenced work. They are urging by advice and demonstration their people to follow suit. Now is the time for them to act.

The first essential of success in this field of work is enterprize. We want the *entrepreneur's* spirit. It should spread in the country far and wide. Then we want a larger diversion of locked-up capital into the fruitful channel of economic development. Money now either idle or but securing an mill return from agricultural lands should be diverted to the starting of large industries. Then, again, the conditions for factory work on a satisfactory basis as between capital and labour should be evolved. Housing of labour, copartnership and generally the pacifying of labour and secuirng its hearty co-operation with capital in wholesale production should be aimed at. With the growth of the industrial spirit, the spirit to emulate western modes of winning something of the profits to itself will be felt by Labour and unless from the beginning the necessary steps are taken, the evils of capitalism are likely to manifest themselves in this country as well. For this the country must prepare itself from the beginning.

During the month of November 1918, seventeen new companies with an aggregate authorized capital of over 90 lakhs were registered under the Indian Companies Act (VII of 1913) in the Bengal Presidency. The respective details are given below:—

		Rs.
8	Trading	75,70,000
2	Oil Mills	3,00,000
1	Tea Planting	6,00,000
1	Planting other than tea ...	20,000
5	Coal Mining	5,50,000

THE FUEL VALUE OF WOOD.

By W. B. Campbell.

Forest Products Laboratories of Canada.

OWING to the scarcity of coal in the winter just passed (1917-18) many people are becoming more interested than heretofore in the use of wood as fuel. It is the purpose of this short article to discuss the value of different woods in this connection.

The primary quality of a fuel is to give off heat when burned. Secondary qualities are ease of handling, ease of kindling, amount of ash, etc. From a chemical point of view the burning of a substance in air simply means the combining of that substance with the oxygen of the air. This reaction liberates heat in a greater or lesser amount depending on the substance burned. The amount of this heat is measureable and the unit used for practical purposes in this country is what is known as the British Thermal Unit or more familiarly as the B. T. U. One B. T. U. represents the amount of heat necessary to raise the temperature of one pound of water through 1° Fahrenheit.

For every combustible substance there is a corresponding "Heat of Combustion" which is invariable for that substance and is expressed as the number of heat units or B. T. U.'s. given off by the combustion of 1 pound. This quantity is the same no matter how slowly or how rapidly the combustion takes place and it has no direct reference to the temperature of the fire. If combustion is rapid a large number of heat units are produced in a short time and consequently the temperrture is high. If combustion is slow the number of heat units per second is small and the heat gets a chance to become dissipated, consequently the temperature is low.

If a fuel is wet the water must all be evaporated during the burning of the fuel and this takes away some of the heat. To heat up a pound of water from the ordinary temperature to the boiling point, evaporate it and heat the steam to the temperature of the chimney gases requires about 1220 B. T. U. Consequently for every pound of water in the fuel this amount of heat goes up the chimney. This loss is present to a greater or lesser extent with all fuels but is particularly important with wood. Coal may contain 2 or 3 per cent water or 40 to 60 pounds per ton. Green wood may contain 1500 to to 2000 pounds of water per cord. Air dried hardwood holds about 720 pounds per cord. The reason for demanding well dried wood is therefore quite obvious.

The next statements may not seem quite so evident but they are equally true. The "Heat of Combustion" or "Calorific Value" is, within narrow limits, the same for all woods. That is, a pound of one wood will give off almost exactly the same amount of heat as a pound of a different wood. This does not mean that a *cord* of one wood will give the same heat as a cord of any other wood because one cord may be much heavier than the other. Some woods are highly resinous—red pine, for instance,—and these have a slightly higher heating value on this account but the difference is not great. The reason for all woods having equal Calorific Values is not far to seek. Fundamentally all woods consist of the same substance and one species differs from another chiefly by the way this is arranged in the wood structure. Since all woods do consist chiefly of the one substance, the Calorific Values of all of them must be the same. Measurements of the Calorific Value show that 1 pound of *perfectly dry* wood yields 8220 B.T.U. For comparison it may be stated that 1 pound of good hard coal yields about 12,000 to 13,000 B.T.U., and poor coals go very much lower. Perhaps it would be better to compare these in terms of cords and tons. One cord of air-dried maple or birch will contain about 3,250 lbs. of dry wood and about 720 lbs. of moisture. Its heating value will then be

	3,250 × 8,220 = 26,715,000 B.T.U.
Less ...	1,220 × 720 = 878,400 B.T.U.

giving a net heating value of 25,836,600 B.T.U. A ton of coal gives a net heating value of

2,000 × 13,00 = 26,600.000 B.T.U.

These two values are very nearly equal so that we can say that *one cord of well-dried hardwood (beech, birch or maple) is equal to one ton of good hard coal.* Other woods have heating values in proportion to their weight per cubic foot.

The following table shows the number of cords of various common woods required to equal 1 cord of well dried hardwood or 1 ton of coal.

Ash	1·10 cords	Poplar	1·55 cords
Basswood	1·70 ,,	Cedar	2·10 ,,
Beech	1·00 ,,	Douglas Fir	1·20 ,,
Birch	1·00 ,,	Balsam Fir	1·80 ,,
Butternut	1·60 ,,	Hemlock	1·60 ,,
Elm	1·00 ,,	Jack Pine	1·50 ,,
Maple	1·00 ,,	Spruce	1·60 ,,
Oak, red	0·97 ,,	Tamarack	1·15 ,,
Oak, white	0·93 ,,		

This table gives approximately the heating value of well air-dried cordwood but the amount of drying is important. Wood piled with the bark on dries very slowly so that when purchasing wood, split wood is to be preferred to small sized round wood since the latter will probably not be so dry and will include more bark and rotten wood which has little heating value.

Some other considerations may at times be as important as the actual heating value of the wood. For instance, the ease of lighting is to be considered if the wood is wanted only for kindling or for a quick fire in the kitchen range in the summer. Cedar and pine are especially good for this purpose. For an open fireplace the hardwoods are best. Spruce makes a very "crackly" fire which is sometimes an attraction but there is always some danger that a spark may be thrown out of the fire to the detriment of clothing or the rug.

Another point worth bearing in mind in connection with the burning of wood in place of coal, is the difference in the amount of ash produced. A cord of hardwood will make only about 50 lbs. of ashes while a ton of hard coal will make from 200 to 300 lbs., judging from the grade of hard coal coming to Canada during the past winter (1917—18), the latter amount is more likely, and some lots will run even higher than this, especially the small "steam sizes." The calorific value of these latter may frequently be as low as 10,000 B.T.U. in place of the 13,000 B.T.U. used in the above calculations.

THE ART OF ECONOMIC DEVELOPMENT.

By "Viator."

In our June number we reviewed at length the first of a series of articles on the Art of Economic Development which Professor Jevons is publishing in the *Indian Journal of Economics.* The second article of the series is now before us and our readers will, we are sure, be glad to know the lines on which Professor Jevons developes his theme. It will be remembered that his object is to lay down the principles which should guide those who are responsible for the economic development of any tract of country. The first step is the preparation of a programme. The second step is to call in the engineers and to determine the cost of the proposed works, the rate of return which they promise and the time needed to complete them. It is at the third stage that the aid of the financier is invoked and it is with this stage that Professor Jevons is concerned in the article under review. It is the business of the financier to provide the ways and means, to investigate what funds may be available and to what extent borrowing can be resorted to. Professor Jevons commences by pointing out that the theory of finance is not intrinsically difficult and that it seems difficult only because it has never been converted into an ordered body of precepts, logically developed from a scientific study of financial operations. He defines finance as the art of regulating the transactions of any individual or corporate body connected with the acquisition, care and expenditure of money so as to achieve a certain aim or end or set of aims. The science of finance investigates and treats of all the monetary transactions of individuals and business firms and of all corporate bodies, whether public, such as the State and Municipalities, or private, such as companies and

charitable associations. Professor Jevons considers that, for many purposes, it is convenient to distinguish between private and business finance and that, again, business finance should be divided into partnership and joint stock finance. The transactions of non-profit making institutions such as societies and clubs he calls association finance. The term public finance he reserves for the finance of municipal and district councils and of the State itself, whether as provincial or central government.

In our opinion, Professor Jevons rightly insists that whether financial operations are carried out by private individuals, corporations or the State, the underlying principles must remain the same. An infinite amount of waste of public money would have been avoided if this dictum had always been acted on. He considers that one peculiar merit of company management is that it forces the persons in control to learn the elementary principles of finance.

The next step is to define the true function of the financier whether in business or in Government. It is for the political leaders or members of the Government in power for the time being to decide on policy. The financier has then to make all the necessary arrangements to enable the policy or projects adopted to be realized. His true aim is to secure the greatest efficiency in reaching the objective by the proper disposition of the monetary transactions. On the other hand, the financier in business must be concerned with management and in Government with policy to the extent that financial consideration of ways and means may veto or limit particular proposals for action and he must know enough of business or politics to see that no injury to his firm or to the population at large results from his financial measures. When Professor Jevons publishes his articles in book form, as we hope he will shortly, we should be glad if he would enlarge on this point. It is, clearly, his view that the financier should have a voice in determining policy, but not a controlling voice. It would be interesting to have his opinion how far this is the case when the Prime Minister is also Chancellor of the Exchequer.

After emphasizing the tremendous loss to individuals, business firms, local authorities and the State which would be saved by the wide diffusion of a proper understanding of the fundamental principles of finance, Professor Jevons commences to formulate these principles by defining the three distinct systems of finance which may be recognized. These are the system of predetermined income, the system of predetermined expenditure and the commercial system. The income of an individual is predetermined when he is employed in a permanent position either at a fixed salary or at a salary increasing according to a prearranged scale. The income of a State or territory which is in a primitive or undeveloped condition is also predetermined. During the later days of the Moghul Empire and the earlier years of British rule, the income of India was incapable of expansion at the will of Government and hence the system of finance forced on the Government of India at the outset was that of predetermined income. This system has remained in vogue in almost all British and Native State finance in India owing to the fact that land revenue makes up so large a proportion of the income of the State and that permanent or long term settlements have been adopted. The system, perhaps, is not quite so rigid as Professor Jevons describes it. The policy in regard to enhancement of land revenue in the past has not been entirely uniform. There have been times when the necessity of making ends meet has meant greater severity in enhancements than at more prosperous periods.

The system of predetermined expenditure is obviously the opposite to that of predetermined income. Here it is the expenditure rather than the income which is determined beforehand. Few individuals are in the

happy position of being able to adjust their income to their expenditure and those curiously enough, belong to the classes which are usually regarded as the poorest. The instance Professor Jevons mentions is that of the casual labourer who in India as elsewhere, is given to working only when he is short of the means of subsistence or when some special need arises. In other words, he may be said to decide what he wants to spend and then to use a part of his leisure time to work just sufficiently long to meet the expenditure determined on. In the realm of State finance, it is the more advanced nations which conduct their finances on this system and English finance gives the best example of it, both in national and local and municipal finance. The budget of expenditure is prepared on the basis of the public needs which are considered to be urgent. The income is adjusted to the expenditure as exactly as possible by additions to or reductions of taxes or rates and the budget usually provides for a small surplus as a margin against possible under-estimation.

In the commercial system of finance, neither income nor expenditure is predetermined but both may be varied from time to time and, in fact, must be varied if business is to be carried on successfully, for he finds that, by so doing, he obtains more than an equivalent increase in his income. The important point is that the commercial system of finance is applicable to all commercial undertakings, whether carried out by an individual company or by Government. That sounds obvious enough, but the Governments of most countries, including India, have often failed to realize the difference between this system and the two previously mentioned and their failure has spelt disaster to many of the enterprises they have undertaken.

The ultimate security for public debt is what Professor Jevons calls the taxable capacity of the community. This he defines as the surplus produce of the people above what is necessary to maintain existence according to the standard of life prevailing at the time in the country concerned. As Professor Jevons admits, the definition is not very exact. The American economist, Mr. Devas, lays down that whenever taxation, instead of being drawn from superfluities, makes an encroachment on absolute or conventional necessaries and threatens to lower the standard of life, the people are being taxed above their taxable capacity. Here, again, more precision seems required, especially in regard to the term "conventional necessaries." It is supplied by Professor Marshall, who considers that the conventional necessaries are those to obtain which the average man or woman will sacrifice some things which are necessary to efficiency. The taxable capacity of the people is thus the extent to which the total social income (that is, the sum total of all the individual incomes received by the persons composing the community) can be diverted into the coffers of Government without reducing the consumption of the necessaries of life, absolute and conventional, to such an extent as to impair the efficiency of the people as workers. It need hardly be pointed out that the luxuries of life in the case of one class of people may be absolute necessities for another class and it is, therefore, impossible to arrive at any precise measure of taxable capacity. Professor Jevons, however, makes an interesting attempt to do so and, for this purpose, divides the people into two classes, Government servants, civil and military, whose salaries are paid out of the taxes and land revenue and rents received by Government, and the rest of the population, including all Government employees in commercial services such as the Post Office. The second class expends its income in four great groups of payments, necessaries, taxes, investments and superfluities or luxuries. The taxable capacity of the people, therefore, consists of the social income of the public which actually pays the taxes together with

that part which is spent on superfluities plus that part of the income of Government servants which is spent on superfluities. The difference between the two classes into which Professor Jevons divides the people lies in the part of their income which is spent on taxes. If the full salaries paid to Government servants are included in the social income, then the whole of the taxes paid by them must be included in the estimate of the total taxable capacity. At this stage, Professor Jevons coins a new phrase, "minimum social expenditure," which means that portion of the social income which is expended on necessaries, absolute and conventional, and is, therefore, the minimum expenditure on which society can exist. Each class of the community has its own minimum social expenditure and its own taxable capacity and for this reason, it is impossible to devise any system such as could absorb the whole taxable capacity of the people. Before such a limit was reached for all classes, some would inevitably be taxed beyond it. In Professor Jevons' opinion, any system of taxation which endeavoured to obtain more than 70 or 80 per cent of the theoretical taxable capacity would be likely to be oppressive. This figure seems to us very high indeed. Later on in his article, Professor Jevons mentions that, before the war, the taxation in most European countries was probably not more than one-fourth to one-third of the taxable capacity, except perhaps in Italy. Taxation up to 70 or 80 per cent of taxable capacity would certainly mean the end of many, if not of most, of the amenities of life for the classes which are now regarded as well-to-do, and would involve a sacrifice on behalf of generations yet unborn which it appears somewhat unreasonable to expect. But the war has proved that there was a considerable opening for increased taxation in European countries. Heavy taxation in excess of the taxable capacity may be imposed and maintained for a short period, say five or six years. Possibly, during the last two or three years, the United Kingdom has been taxed beyond its taxable capacity though we doubt it. Considerations of space prevent us from describing the two methods by which Professor Jevons thinks that an estimate of the taxable capacity of the population inhabiting any territory could be framed on a statistical basis. He passes on to consider the results to be gained from increased taxation. The effects of such taxation, in the case of individuals, vary according as the taxation is direct or indirect, *i.e.*, according is it is in reduction of income or is based on commodities. If it is in reduction of income, the individual curtails his expenditure in different directions in varying degrees. There are some forms of expenditure—the cynical person might point to charity as an example—which he can give up without a pang. Professor Jevons puts the case in more technical language when he says that the individual will curtail to the greatest extent expenditure on those commodities or forms of enjoyment for which the marginal utility functions (utility curves) are most elastic. In the case of taxes on commodities he reduces his expenditure according to the extent to which the commodity is a necessity to him or, again in the technical language of the economist, "in accordance with the elasticity of his utility curve for the commodity in question, and the extent of the rise of price." Of more importance in connection with Professor Jevons' main theme are the social results of increased taxation. These are of two kinds, those which are consciously sought by the Government or other organizations of the community and those which occur unconsciously and spontaneously. The first of these classes can again be divided into two. The first sub-class comprises the primary reactions of the tax itself, such as a decrease in the consumption of alcohol due to an increase in the tax on it. The second

sub-class consists of the results due to changes in the environment of the people brought about by the expenditure of the money raised by taxation upon providing public works or improved housing and sanitation and, indirectly, by education. In this sub-class are also included the subjective changes which enable people more fully to assist one another and to benefit by and enjoy their improved environment.

As a preliminary to dealing with the results flowing from increased taxation, more especially in bringing about changes of environment, Professor Jevons discusses the form of government in relation to the control of public expenditure. The autocratic form of government, in which is included bureaucratic government, and which Professor Jevons designates "government by control," may be very good or very bad but, in neither case, has the people any voice in the regulation of public affairs or their own welfare so far as it is affected by the general environment. Democratic government, on the other hand, is merely the supreme executive organ of the people themselves, and in the perfect democracy, marginal equilibrium would be maintained between public and private expenditure exactly analogous to the equilibrium between the private person's expenditure in different directions. In less technical language, the people would themselves decide whether money should be spent in satisfying communal wants such as schools, sanitation or communications rather than on their own private wants as individuals. Professor Jevons shows that, in a democratically governed State, the system of predetermined expenditure is adopted as the result of the balance between wants most easily satisfied by communal effort and those most advantageously satisfied by private action.

Few even of the most ardent believers in democracy will differ from Professor Jevons' view that the control of expenditure is a serious weakness in the democratic system of government which can act only with the average intelligence and foresight of the people as a whole. The inevitable weakness of democracy can, Professor Jevons thinks, be overcome in two ways. The first is for the whole community to be familiarised with the principles underlying economic development so that they may come thoroughly to understand the need for careful planning of expenditure years in advance of the realization of benefits and also learn the necessity for subordinating purely local interests to the achievement of ultimate general efficiency. As an instance of the subordination of general to local interests, the pressure brought to bear in Australia and America on the State Government to get a particular bridge or branch railway constructed is mentioned. This sort of pressure is not entirely unknown in England and Ireland might certainly have been added to the category. In India, Professor Jevons thinks, a mistake has been made in handing over the control of making new roads and light railways to District Boards thereby encouraging the satisfaction of immediate local interests at the expense of delaying the general benefit of the community which would flow from plans centrally initiated and controlled. He is not at all hopeful in regard to the possibility of educating the whole community to a sufficient understanding of the principles of economic development for them to be able to control it directly through their elected representatives. It is not an impossible process but it will be a very slow and lengthy one. The second method he suggests for overcoming the weakness of democracy in the matter of control of expenditure is likely to prove more fruitful of results. It is to convince the people and their representatives not only that scientific development by an ordered programme is enormously important but also that it is an inherently complex and difficult business which should be handed over to experts. Those experts must, of

course, be given the requisite funds for the purpose. In the case of Government by control, matters are obviously simpler and once Government has realised the principles of economic development and the advantages of applying them, there is no difficulty in appointing its experts. The body of experts, once appointed, should be given full control of public works and other directly economic measures and should, at least, be consulted about, if it is not placed in charge of, the reform of housing and sanitation. For the purposes of economic development Professor Jevons classifies the expenditure required for changes in material environment under five heads. The first is expenditure which has a directly pleasing effect such as that on new parks and public buildings. The return from this is not economic but takes the form of direct enjoyment. The second is expenditure which is productive of health and therefore of efficiency in economic production such as that on sanitation and garden cities. The third and fourth classes are those in which the expenditure is either immediately economically productive as in the case of some roads and railways or becomes so after some years as in the case of docks, irrigation works and some railways. The last class is expenditure which is economically productive but only with slow cumulative effect such as that on education, on improved land tenure or agricultural instruction. The return from this is delayed but it gradually becomes very great indeed.

Professor Jevons concludes the article under review by an examination of the effect of expenditure of these classes on the taxable capacity of the people. Expenditure of the first class obviously has little or no effect on taxable capacity whereas that of the remaining four classes tends sooner or later to increase it to a very considerable extent. The increase in efficiency resulting from improved sanitation or housing may, in the course of a few years, increase taxable capacity by 200 or 300 per cent more than the increased taxation necessary to pay for the sanitation or the housing. After thirty years, a railway or irrigation work may easily repay its cost every year in increase of taxable capacity. If the future return in taxable capacity resulting from expenditure on education, taking as initial expenditure say the total of recurring expenditure during a period of three years were reckoned, Professor Jevons thinks that thirty years later, the increase of taxable capacity which could be imputed to it—provided it were possible to trace it separately—would be equal to the whole three years' expenditure.

It will naturally be asked why, if expenditure on changes in the material environment produces the results stated by Professor Jevons, the world is not progressing in wealth and taxable capacity at a speed which would make every body immeasurably better off in a generation. Professor Jevons gives two reasons why progress is so much slower than his figures would lead his readers to expect. The first is ignorance of the enormous possibility of such outlay together with wastefulness un-coordinated and ill-conceived efforts and the second is the fact that capital has to be invested and a burden of expense incurred whilst waiting for the return. Every scheme for a new public work or for any reform of an educational or social kind means putting a burden on the taxpayers in advance of the benefit which will later on accrue in the form of increased taxable capacity. The number of new schemes which can be taken up at one time is limited by the existing margin of taxable capacity which is not already taxed and the extent to which the people's wishes or political considerations allow this to be trenched on. It is for this reason that the relation of taxable capacity to economic development is so important. The greater the unused margin, the greater the opportunity of putting in hand schemes and reforms the

benefits of which take time to mature. In a democratic country, the people at large have to be educated to understand this relationship and to be willing to make some present sacrifice for the certain future prosperity of their country. In a country which is governed by control, the Government can safely proceed with a reasonable programme of public works and measures involving the gradual increase of taxation which should be as widely distributed as possible. Government should, however, take the public into its confidence in regard to what it is doing.

In the remainder of his section on Finance, which we have been privileged to see in proof, Professor Jevons discusses the question of the extent to which expenditure on economic development should be met from current revenues or from loans. Our review of a singularly interesting and informing article has, however, run to great length and we shall, therefore, follow Professor Jevons' example and break off at this point. We hope to return to the subject at a future date.

An advertisement which appeared a short while ago in a Berlin paper offered soft, delicate clinging fabrics of artificial silk and paper for ladies' and children's use. Skirts of washable paper fibre sell readily; and aprons, petticoats and stockings are being made from paper wool. Blankets and counterpanes, blinds, and even bathroom towels are being made from materials woven from paper and wood pulp, and commoner clothes such as are used for shirtings, undervests, and children's underclothes are made entirely from paper. It is said that this paper material will stand washing twice or even, with care, three times, after which it goes to pieces. It is difficult to mend in the ordinary way, the materials most favoured for repair work are a tube of seccotine and a copy of the *Deutsche Tageszeitung* or of *Lustig Blatter.*

LARGE AND SMALL HOLDINGS IN ENGLAND.

BY K. KUNHIKANNAN, M.A.

AT this time when attention has been drawn to the fragmentary character of the Indian holdings and the reduction of a considerable percentage of these beyond the economic limit, the history of large and small holdings in England will not be without interest. Widely different as the conditions of the two countries are, a study of the precise effect of economic, social and political factors on the character and size of holdings in England may afford some clue as to the solution of the problem in India, the more so because in English Agricultural History, periods of *petite culture* have been followed by capitalist farming and when this latter had persisted for long and seemed secure against changing conditions the tendency to a reversion to small holdings again appeared.

Before dealing with the causes which led to this alternating predominence of large and small holdings it is necessary to refer briefly to the economics of the various classes of holdings in England. What is classed as a large holding in India would not come under that heading in England. The small holdings which preponderated in the 18th century consisted of (1) Small plots owned or leased by day labourers who worked them as a subsidiary occupation, (2) Small Farms worked usually by the tenant and his family who depended on them solely for support, (3) the holdings owned and worked by the Yeomenry who also employed little outside labour. The sizes of these three classes of holdings varied with the locality but usually the first kind never exceeded five acres, the typical holding of the second order ranged between ten and twenty-five acres and in particular tracts between fifty and sixty acres. The difference in size between the

second and third was very little but some properties of the Yeomenry reached a hundred acres. Besides these three classes there were the large farms varying from hundred to a thousand acres. These were first formed in the 15th century when the flourishing trade in wool with Flanders gave an impetus to sheep breeding and rearing which is always best done on large farms. These large farms, however, were far from numerous in the 18th century because during the intervening two centuries there was a reaction in favour of small holdings.

From the very small holdings very little came to the market as their produce was hardly sufficient for the support of the families working on them. The tenant farmer and the Yeomen grew little corn for the market but they excelled in the lesser branches of agricultural produce as beef, mutton, pigs, poultry, fruit, vegetables, eggs, butter and milk, all those in fact which cannot be left in the hands of hired labour but require the personal interest and attention of the owner. On the other hand, on large farms corn growing was the sole occupation as hired labour could not be trusted with the more mechanical processes to which it had been reduced and as it was more quantity than quality of labour that was required. It follows from these features of the various types of holdings that the predominence of large or small holdings at any particular time will depend on what kind of produce whether corn or minor produce of the small holdings fetches the highest return for the capital and labour employed.

With this brief reference to the economics of the large and small holdings, it becomes easy to follow their history through the 18th and 19th centuries. In the first half of the 18th century the price of wheat was only 34*s.* 11*d.* whereas in the last decade of the 17th century it stood at 45*s.* 8*d.* During this period the population rose rapidly in wealth and in numbers and along with it the wages of the labouring classes so much so that the latter could afford the consumption of meat, butter and eggs. The small holdings which produced them were, therefore, in a very flourishing condition. The large farmers had on the other hand to face a serious fall in the price of the one commodity they produced, *viz.*, corn. They continued to pay rents based on the prices at the end of the 17th century. They were not, however, in serious distress for William III 's bounty on exported wheat stimulated export and tended to keep up prices. Nevertheless conditions were too unfavourable for the extension of large farms either in area or number.

In the second half of the 18th century these conditions were completely reversed. Food harvests became the exception rather than the rule. The supply of home grown wheat fell short of the requirements of a rapidly growing population. England began to import corn instead of exporting it. And this import ceased under the continental system of Napoleon by which he isolated England during the French wars. The result was a continuous rise in the price of corn from 34*s.* 11*d.* between 1760 and 1765 to as much as 122*s.* 8*d.* in 1812 or by nearly 360 per cent. During the same period the wages rose only by 60 per cent. These were famine conditions which speedily produced a terrible deterioration in the condition of the masses. The demand for fruits, vegetables, meat, etc., diminished to a corresponding extent and the tenant farmers and the Yeomenry who produced them were adversely affected. The large farmers found themselves in an immensely better position. Corn was most profitably grown on them. The labour-saving implements were best employed on them. Their tenants were drawn from a more intelligent and better educated and wealthier classes were therefore less conservative to Agricultural practices. They could employ more capital for the

extensive operations of fencing and drainage. This class alone among the agricultural population prospered and was swelled by men drawn from other walks of life. The number of large farms thus rapidly multiplied at the expense of the small holdings.

The small holder could not face the new situation both by training and habit. He had not the capital nor the inclination to depart from existing methods and even where he was inclined he could not produce corn as cheaply as the large farmer. There was even a greater obstacle in the old common field system with its traditional intermixture of stripe, customary regulation of tillage and common rights of pasture which did not allow any alteration in the traditional methods of cultivation. He could not escape a general rise in rents which the large farmer paid with ease, nor was he any longer a welcome to the large land owner who could more easily collect his rents from a few prosperous tenants than a host of small tenants always in difficulties and who had to spend less on buildings and repairs when farms were few.

Under these adverse conditions the small holdings rapidly disappeared. The land holding day labourer was the first to go, next followed the tenant farmers who could not pay the enhanced rents, sometimes ten times what they were before. Of the Yeomanry who had to pay no rents many became indebted and were finally ruined by the expenses of enclosure forced on them by néighbouring landlords. Others finding the enormous rise in the price of the land sold out their properties and became large farmers. The land released from all these classes went to enlarge the large holdings.

On the economic side the consolidation and extension in area of the farms resulted in a most gratifying increase in production. The supply became equal to the demand. There was a rapid improvement in technique and methods. But it was at a tremendous sacrifice. It degraded to the position of day labourers what had been a numerous and flourishing class of small tenants and independent proprietors. And even the labour for wages. to which they were condemned, was obtained with difficulty and paid miserably for the labour market became overstocked and wages had fallen. The country as Goldsmith put it was a "Garden and a Grave." There was no alternative but to migrate to towns to find employment. It was fortunate that this revolution in Agriculture took place about the same time as the rapid development in industries. Otherwise the distress of the Agricultural proletariat which the revolution created might have had serious consequences. As it was, it produced that rural exodus which social reformers have always lamented and which has not been arrested to this day.

The large farms continued to increase till the last decade of the last century. On the close of the French wars in 1815 the landowners anticipating a fall in the price of wheat passed the Corn Laws thus effectively shutting out imports. These laws continued till 1846 and under the artificial inflation of prices created by them the large farms continued to increase in extent and number. The condition of the labouring poor went from bad to worse, the demand for labour in towns as well having fallen off as a result of the frequent industrial crises which occurred between 1817 and 1845. The small holdings had, therefore, no chances whatever in the face of the diminished consumption of the commodities they produced.

When the Coru Laws were finally abolished in 1846, it was expected that the free import of foreign corn would bring down prices but the large farmers were equal to the occasion. Reckoning on low prices they employed every means to diminish the cost of production, such as artificial manures, improved implements, drainage, etc. They combined pastures with arable farming for the demand for meat had risen with the rapid revival of Industries and the

rise in the wages. The manure from the animals kept went to fertilize the corn while these improved methods diminished the cost of production. The expected fall in the price of corn did not take place. The large farming system, therefore, far from being adversely affected reached its highest level during the thirty years following the abolition of the Corn Laws.

But from the year 1870 onwards just when the large farms had almost a century and a half of continued prosperity and appeared secure comes a change. The price of corn rapidly fell as a result of the cultivation of enormous tracts of virgin soil in Canada and Australia and transport became quick and cheap. Scientific technique and capital were unequal to this combination. Furthermore, the increase of wealth of all classes raised the standard of living and fruits, vegetables, dairy produce, etc., the branches in which small farming excelled, were in great demand. The new economic situation thus favoured the smaller unit of holding and they tend to increase while the large farms are no longer taken up for growing corn. Between 1870 and 1900 the area of arable land fell from 24 to 19·5 million acres and pasture land (in small holdings) rose from 22 to 28 million acres. To this economic tendency are offered serious social and political forces. Land in extensive and continuous blocks is in great demand among the wealthier classes for partridge shooting and other social amenities. They purchase it not as an investment but rather for the social prestige and political influence it brings. This hindrance to an economic tendency is being gradually removed by legislative interference. For the conversion of farms into shooting preserves had made England increasingly dependent on foreign countries for her food, a dependence which has been strikingly demonstrated during the present War.

From this short historical review, it would appear that there are particular types of holdings suited for particular branches of agriculture. Where quality rather than quantity of labour counts and the personal interest and attention of the owner are important elements in success as in dairying, stockfarming, fruit and vegetable growing, the small holding is the type best suited. In those branches of Agriculture in which the farm operations have been reduced to a series of mechanical processes carried out by labour-saving implements and in which intensive application of capital rather of labour is required, the large farm pays best. One or other of these types has predominated in accordance with the relative demand for the products of each. When animal produce, vegetables and fruits fetched comparatively higher prices than corn, the small holdings flourished and increased in number. When corn was dear and the demand for minor products fell off the large farms preponderated. An equally interesting conclusion is that improved methods and technique are more profitably and economically employed on the large farm, whose tenants drawn from a wealthier and more educated class will more rapidly and effectually adjust themselves to changing conditions. But even they cannot achieve economic impossibilities.

Intimation has been received from His Majesty's Secretary of State for India that it is no longer necessary to submit priority applications to the Ministry of Munitions for material required from the United Kingdom. The Indian Munitions Board will still, however, be prepared to assist in the case of urgent demands. In such cases applications should be submitted, in duplicate, on the existing form, to the local priority authority concerned. If the Indian Munitions Board is satisfied as to the grounds of urgency, a telegraphic recommendation will be made to the Secretary of State for India subject to the conditions now in force with regard to telegraphic recommendations.

CHEMISTRY AND THE ARTS.

BY R. PALIT.

THE wants of civilization and the effects of competition require the effective application of increased power, with regard to economy both of labour and of time; and, in the gratification of these wants, there is a constant aim to render objects, apparently of little value, useful and productive. The benefits conferred upon industry by mechanical science are also afforded still more strikingly by her younger sister—chemistry. In examining the various applications of chemical science to manufactures, we find that they naturally divide themselves into the following three heads:—

(1) Chemical appliances, which have added to human power either by furnishing substitutes for mechanical contrivances, or by affording tools and methods for arriving at results formerly impossible.

(2) Methods of producing economy of time, generally resulting from a constant tendency to simplification.

(3) Methods of utilizing products apparently worthless or of endowing bodies with properties which render them of increased value to industry.

When a manufacture is already established, the results of competition not only compel an increasing attention to the economy of power or of time, but also require an increase of the industrial value of the article offered for competition. He who can replace an expensive mechanical power by a cheap chemical process or can economize production by the happy adaptation of natural forces, must possess advantages over his less skilful competitors. Vulcan produced his works more economically than the more mortal blacksmiths of his time, by availing himself of the fires of Mount Etna for his forges. The possibility of doing what previously could not be done generally has a moral as well as a physical result. The communication of a new power often occasions great social changes.

It has justly been said that the discovery of the Greek fire projected from the walls of Constantinople "saved Europe from desolation by the Saracens"; and it is equally true, that the personal animosity of warriors and the hostile spirit of nations have been much subdued by the new system of tactics introduced when a German Monk, in deflagrating a mixture of sulphur, nitre and charcoal, discovered gun-powder. Morality was improved and crime lessened, when the brilliant lighting of our streets by the introduction of gas made every passer-by a detective policeman.

In addition to the direct communication of power, the increased economy of time resulting from chemical appliances is of immense importance in manufactures. This sometimes follows the discovery of new bodies endowed with peculiar properties, but it far more commonly arises from the reduction of a complex to a simple process. It is with chemistry as with mechanics; the progress of discovery is in the direction of simplification. The simplification of complex processes is the economy of labour, the husbanding of wealth. Industry, in its progress, continually finds more ready means of cultivating and reaping fields long in its possession. We believe many of our readers are familiar with the story of poor Ho-ti and the pig, told with such delightful vivacity by Charles Lamb. When Ho-ti's house, containing a litter of pigs was burned to the ground, it was natural, as a consequence of this discovery, that the inhabitants of Pekin should introduce pigs into their houses, and burn them down, when they desired to participate in a dish so savoury; but it was

a great discovery when an ingenius person found that a common fire would equally do well, and that it was not absolutely necessary to burn down a house every time a pig had to be dressed. "By slow degrees," concludes the Chinese history, "do the most useful and seemingly the most obvious arts make their way among mankind." The moral of this well-known story is of everyday occurrence in the chemistry of arts. Not a year passes without the most mature processes of manufacture being further simplified and economized.

It is with industry as with nature; many of the lower animals have a repetition of organs, destined for the performance of functions similar to those exercised by single organs in the higher animals. Various stomachs and several eyes in the lower animals are not more effective than one stomach and two eyes in man. The law of repetition of organs is like the complex processes of manufactures, represented by fewer but more perfect methods as civilization advances. The industrial position of Europe has been gained by her perception of this truth, and by her constant endeavours to replace complex processes of manufacture by means more simple and perfect.

The third division, into which we would divide chemical applications to industry, is one peculiarly characteristic of advancing civilization. European nations, as their wants increase, examine every material, to see if it could be adapted to their needs. Using their heads for sublimer purposes, they observe and investigate the phenomena and properties of each body, so as to ascertain how far it may be made subservient to their desires. In these investigations chemistry offers vital aid; she, like a prudent housewife, economises every scrap. The horse-shoe nails, dropped in the streets during the daily traffic, are carefully utilized by her and re-appear in the form of swords and guns. The bones of dead animals yield the chief constituent of lucifer matches. The dregs of port-wine, carefully rejected by the port-wine drinker in decanting his favourite beverage, are taken by him in the morning, in the form of Seidlitz powders, to remove the effects of his debauch. The offal of the streets and the washings of coal gas re-appear carefully preserved in the lady's smelling-bottle. This economy of the chemistry of art is only in imitation of what we observe in the chemistry of nature. Animals live and die; their dead bodies, passing into putridity, escape into the atmosphere, when plants again mould them into forms of organic life; and these plants, actually consisting of a past generation of ancestors, form our present food.

The manufacture of iron from the native ores has been greatly facilitated by the knowledge of chemical science. The mode of smelting iron consists in mixing the ore with lime and coal, the former producing a slag or glass with the impurities of ore, while the coal reduces the oxide of iron to its metallic state. Much heat is spent in the process of smelting, but the cold air blown in, as the blast, lowers the temperature, and compels the addition of fuel, as a compensation for this reduction. Chemistry pointed to this loss, and now the air is heated before being introduced to the furnace. The quantity of coal is wonderfully economized by the application of science; for, instead of seven tons of coal per one ton of irou-ores, three tons now suffice; and the amount produced in the same time is increased nearly 60 per cent. Assuredly this was a great step in advance. Large quantities of ammonia, which were annually lost before the days of Chemistry, are now readily collected and utilized. So it is needless to state that the chemical science has added to human power, by increasing production and economizing to a great extent both the time and the materials employed.

Without the aid of chemistry it would have been impossible for textile fabrics to have attained their present development. The

bleaching of cotton and linen was not much practised until about 150 years ago; before that time they were sent to Holland, where the operation of bleaching consisted in steeping them in potash for a few days, afterwards for a week in butter milk, and exposing them for several months on a meadow to the influence of the sun and the moisture. A great improvement was made in Scotland by substituting sulphuric acid for sour milk; and the immediate effect was to reduce the time from eight to four months. In 1785, a French chemist suggested the use of chlorine as a means of hastening the process, and in the last year of the 18th century, a compound of this gas with lime was introduced by Tennant of Glasgow. The development of cotton manufacture now became immense.

By a happy adaptation of the chemical processes, in conjunction with the bleaching power of chlorine, the time required for the whitening of cotton and linen fabrics was at once reduced from months to hours; while the miles of outstretched calico, defacing the verdure of country districts disappeared, the whole operation being carried on within the small space of an ordinary factory. Our readers may well imagine what an impulse chemical science gave to a trade so important as this. The bleaching of calico now consists of a chemical operation of great precision.

We cannot but refer to the triumphs of chemistry in calico-printing—an art which has grown with its growth and become stronger with its strength. The knowledge of mordants and of colours are the results of chemical discoveries. Lapis Lazuli, long celebrated for its beautiful blue, almost ranked among the precious stones, and was sold at a price which put it quite out of the reach of the calico-printer. But chemists ascertaining its composition by analysis, soon learned how to make it by synthesis.

The application of chemistry to dyeing deserves especial attention. Madder, the dye most commonly used for calico, after imparting its colour, was considered useless. The large quantities of spent madder constantly accumulating were found exceedingly inconvenient. It was not valuable enough for the manure heap, and the rivers became polluted in carrying away the waste material. But chemistry has shown that actually one-third of the colouring matter is thus thrown away, and that simple treatment with a hot acid again renders it available as a dye. These waste-heaps are now sources of wealth, and the dyer no longer poisons the rivers, with spent madder, but carefully collects it, in order that the chemist may make it again fit for use.

Stannate of soda is a salt largely used by calico-printers. The usual mode of preparing it was: (1) tin was reduced from its ore; (2) this tin was dissolved in muriatic acid; (3) it was oxidized by nitric acid or chlorine; and (4) the oxide thus formed was precipitated and re-dissolved by soda, this bulky, aqueous solution being furnished to calico-printers.

Mercer simplified the process and obtained it in the solid state by two operations: (1) the tin was obtained as before; (2) this tin was fused with a mixture of nitrate of soda and caustic soda, the former oxidizing it, and the latter forming stannate of soda with the oxide thus formed. The common ore of tin is an oxide; why, then, was it necessary to reduce it to the metallic state merely to oxidize it again? He, therefore, fused the ore at once with soda, the impurities remaining undissolved, and the salt was made by one operation. We quote this instance as a remarkable example of the tendency of chemistry to simplify processes of manufacture.

We might refer to the important discoveries of yellow and red prussiate of potash, the former of prussian blue; but this would only be to cite one out of innumerable appliances. We prefer, therefore, to finish

this part of the subject, by alluding to the resists and discharges used in calico-printing. In order to preserve white patterns in the process of dying, in India, whence calico-printing originated, mechanical devices are still employed, each white spot being covered with sealing-wax, or by being tied up and protected from the dye. By the aid of chemistry, we either discharge the colour on the cloth, or we put upon it bodies which resist the action of the mordants and prevent the colour attaching to that particular part. Acids made from the lees of wine (tartaric acid) and from the lemon (citric acid) are now largely used in these operations, and hence come the beautiful patterns we enjoy in our dress. It was found that, even when the whites were thus obtained, they became soiled in washing off the excess of mordants from the other parts of cloth; and the only mode of preventing this was, to treat the cloth with a bath of cow-dung. So, nothing can be gainsaid against the triumphs of chemistry in the dyeing of textile fabrics, whether of cotton, wool and silk or their mixtures; and we endorse the dictum that without the application of chemical science to the dyeing of textile fabrics, we would not have obtained so cheaply the beautiful patterns we enjoy in our dresses.

Chemistry is the foundation of those arts which furnish us with saline substances—an order of bodies highly useful in the affairs of common life. The successful manufacture of glass and various kinds of pottery, matches, soaps, etc., requires chemical knoweledge of the substances employed, of their possibility as affected by difference of proportion, or by the admixture of foreign substances, and of the means of measuring and regulating high degrees of heat. The successful manufacture of bricks and tiles requires a knowledge of chemistry.

Formerly, the shavings of leather were treated as waste, scarcely fit for the manure-heap, but chemistry has shown that they contain much nitrogen which renders them well-adapted for the formation of the beautiful colour, known as Prussian blue.

The manufacture of candles has been much improved by the aid of chemistry. Tallow candles or their more expensive substitute wax, were used before. The tallow itself was impure, containing cellular tissue, which was only partially removed in the form of a scum. This impurity rendered the light unsteady, and obstructed the wick. The old method of purification has been replaced by a new one in chemically treating the tallow with sulphuric acid and melting by steam. Much of the impurity is thus removed and purer tallow is obtained. But the researches of Chevreal proved that fats consist of fatty acids, combined with a kind of sugar named glycerine, which required to be removed, and this glycerine plays an important part in the world of drugs.

We thus see that a great transformation has, of late, taken place in the sphere of many of the useful arts that contribute to the comfort of man, and this has mainly been done by researches in the domain of chemistry. It is a hopeful sign of the times that many of our young men now betake themselves to this branch of science and are trying to help forward the industrial regeneration of India in a tangible way.

A recent development in the metallurgical industry which merits comment is the very great increase in the production of steel made by electric furnaces. According to Professor Carpenter, F.R.S., of the Imperial College of Science and Technology, previous to the war the output was so small that it did not figure in any returns of steel production. Nevertheless, in 1917 no less than 110,000 tons of electric steel were made, of which 90,000 tons were in the form of ingots and 20,000 tons in castings. At the present time upwards of fifty furnaces are at work in the various Sheffield works.

COLLECTION OF FUNDS FOR ECONOMIC PURPOSES.

BY R. TIRUNARAYANA AIYANGAR,
B.A., B.L.,
District Economic Superintendent, Kolar.

THE collection of funds for Economic purposes is of the utmost importance. The Village Improvement Committee, the Town and Taluk Progress Committees and the District Committee will all have more life put into them if they have got decent funds to administer. Any ambitious scheme of obtaining large sums of money by means of contributions, subscriptions and otherwise, will be more an interesting reading of statistics than one suitable for practical working. Above all a steady and assured annual income, however small, is what is most desirable. If the question of collecting a Common Fund for each village is satisfactorily solved, the funds for the several committees would also be assured.

In the Circular appended to G. O. No. R. 9034-43—L. R. 10-14-139, dated 19th April 1915, collecting a Village Fund is the prescribed as one of the Primary or Obligatory Duties of the village agency :—

"Each family in the village may be induced to contribute something every year according to its means towards the formation of a Village Common Fund in addition to the weekly labour, and special contributions for supplementing Government grants or other special works. Advantage may also be taken of marriages, festivals and other social and religious gatherings, as well as other auspicious occasions to obtain voluntary contributions. The funds raised in the village should on an average amount to not less than as many rupees as there are families in the village.

* * * * *

The Committees shall have full power to utilize the common fund for any work of common benefit to the village with the approval of the villagers as a whole at a meeting convened for the purpose........."

The collection of the Village Common Fund in cash is beset with many difficulties. The raiyat is likely to feel it a hardship, especially, as this contribution is to be in addition to the weekly labour, and special contributions for supplementing Government grants or other special works. In the next place the collecting agency, which for sometime to come could only be the present set of village officers, is defective and there would be much scope for leakages. There are likely to be many complaints and as it is only a voluntary contribution many a villager might cease to pay if his grievance is not redressed to his satisfaction. The best way of forming the Village Common Fund is to make the collection in the shape of grain at the time of harvest. The raiyat will not feel the contribution as a burden. In many villages when measuring the new harvest heap of grain in the *Kana* the first measure is called "God's Measure" and is utilised for charitable purposes. It is also very common for mendicants of all sorts to collect themselves in the *Kana* when the new crop is being measured and taken home. The last few seers are invariably distributed among these mendicants. To make charity in the shape of grain at the time of harvest is an inborn habit with the raiyat and he will not grudge paying a small stipulated quantity of grain for the purpose of his village common fund. This will be moving in the line of least friction and in a way which would be agreeable to the raiyat. In the next place there will be no difficulty about collection since the illiterate Patel also might do this work easily and satisfactorily without waiting for any extraneous help. He knows the number of *Kulas* in his village and the stipulated quantity which each householder has to pay. There will be no leakages whatsoever, as the Patel who in this work should always be helped by the Village Improvement Committee, cannot possibly misuse the small quantity which he gets from each householder. In places where the Patel cannot be called a respectable man and is not in affluent

circumstances the most respectable and affluent man in the village might be selected to be the custodian of the common fund grain The villagers will have the satisfaction of seeing their common fund in their own village in a perceptible form.

Ragi should be the grain to be collected as it is the crop which is universally grown throughout the State. In the rare villages where the wet area is far in excess of the dry area paddy might be substituted for ragi. But the total collection of paddy should be converted into ragi as the latter could be preserved without damage for a longer period. The quantity to be paid by each raiyat might be fixed at ten seers whose value in normal years is less than a rupee. In villages it is inadvisable to prescribe any sliding scale of payments according to the circumstances of each householder. The usual custom in the village for all communal purposes such as "Marihabba, etc.," is to assess equally every householder irrespective of his means. If the proposed scheme is to have a permanent foundation at all it should be based on this *mamool.* It is left to Economic workers and the local officers to appeal to the philouthropic side of the rich people to contribute more for the benefit of their own village. But the obligatory minimum payment for each householder, except for those living by wages, should be fixed at ten seers per annum. There might be a few recalcitrant elements here and there. But they could be overcome by judicious encouragement by the Sheikdars and enquiries by the Amildar during his tours.

It is very desirable that the Common Fund should be preserved in the shape of grain alone without being converted into cash. If the scheme is worked properly it will be found that in the course of some years the total stock of grain in the village in the shape of the Village Common Fund, would be equal to the total annual out-put of the village of that crop. Such permanent stock of grain in the village might be able to mitigate the effects of famine even. Fifty per cent of the collections might be reserved as a famine fund. The balance might be lent out to needy raiyats of the village at a small rate of interest. The interest so earned would in a year or two enable the village to meet its annual communal expenditure for economic purposes, such as, contribution to the Taluk Progress and District Committees, subscription for newspapers and journals, etc. When the accumulations exceed the average annual out-put of the village, the surplus might be sold and the proceeds utilized for some permanent benefit of the village.

The number of agricultural householders in the Kolar District might roughly be taken to be 1,10,000. At the rate of ten seers for each householder the annual collection of the whole District for the Village Common Fund would reach the grand figure of 11,00,000 seers or a quantity almost equal to the total annual consumption of ragi in the Kolar Gold Fields.

The collection of the Village Common Fund in the shape of grain would facilitate the starting of Village Co-operative Grain Banks. Each taluk should be divided into a convenient number of units for purposes of starting Village Co-operative Grain Banks. Each unit will have a number of villages attached to it and the central village wherein the Bank is to be located, should be selected with due regard to the availability of competent men for working the Banks. The Village Common Fund grain of every village included in the unit might be kept in fixed deposit in the Bank in the name of the Patel subject to the condition that 50 per cent of such deposits should always be kept in reserve in the shape of grain. This procedure while supplying capital for the Bank, would ensure safety to the fund and augment it by means of the interest it would earn.

The scheme might be systematised and worked in the following manner:—

(*a*) Every ryot who owns ploughs and cultivates lands in the village shall pay ten seers of ragi annually. Non-ryots, such as, traders, artizans, etc., except coolies, should also contribute a similar quantity.

(*b*) Every village shall maintain a register with the following particulars:—

(i) Serial Number,
(ii) Name of ryot,
(iii) Quantity and kind of grain,
(iv) Date of payment, and
(v) Remarks.

An ordinary good Exercise Book would do and it will last for a number of years even in the case of the biggest village. In the front page there should be a certificate as to the number of pages the register contains.

(*c*) The register shall be written up by the Shanbogue every year at the time of the Taluk Jamabandi and submitted to the Amildar for signature. It should be given to the Patel with the Taluk seal.

(*d*) The grain shall be collected at the time of harvest by the Patel with the help of the local Village Improvement Committee. The quantity so collected shall be kept in the custody of the Patel or other reliable person to be decided by the villagers. The total collection should be receipted in the register by the person who takes possession of the grain.

It is very essential that the collection should be made in the harvest season. Otherwise the ryots would find it difficult to subscribe, specially, when they are exhausting their stock.

(*e*) After the grain is collected from all the ryots in the village and the total collection is receipted as aforesaid, the Patel when he goes to the Taluk Office for remitting the *khist* amount, should submit the register to the Amildar for his perusal and signature.

The aforesaid method having assured a steady and assured annual income for the Village Common Fund, the collection of funds for the Taluk Progress Committees and the District Committee is rendered easy. Each Village Improvement Committee shall subscribe annually a sum of rupees two only, of which one rupee will be credited towards the funds of the Taluk Progress Committee and the other rupee towards the funds of the District Committee. In the case of big villages there will be a Village Improvement Committee for each village while in the case of small villages there will be one such Committee for a group of villages not exceeding six. It therefore follows that in the case of small villages the incidence of contribution will be very low. No Village Improvement Committee can therefore grudge paying an annual subscription of rupees two only, especially as has been pointed out that this expenditure could be met out of the interest earned annually on the lending out of the Village Common Fund.

In the Kolar District there are at present 2,500 Village Improvement Committees. If each Committee pays annually the small sum of rupees two, the District Committee will get an annual income of Rs. 2,500 and the eleven Taluk Progress Committees a like sum. This steady and assured annual income might be supplemented by other contributions and subscriptions from members. Most of the Taluk Progress Committees at present have not been able to collect annually a sum of Rs. 100 and earn the Government grant of Rs. 100. The arrangement now proposed assures each of the Taluk Progress Committees the annual Government grant of Rs. 100. The District Committee cannot rightly expect any contribution from Government as it is already paying the travelling allowances of the members and an annual contingent of about Rs. 400 besides the pay of the establisment and the allowance to the Secretary.

A NOTE ON THE IMPROVEMENT OF MYSORE CATTLE.

BY S. N. APPANNA IYENGAR, B.A., B.L.,

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MYSORE is essentially an agricultural country. Eighty-six per cent of the population depend upon agriculture for their living, and the maintenance and rearing of cattle forms naturally a very important subject for consideration.

This subject may be classified under three heads:—

(*a*) Cattle breeding,

(*b*) Cattle feeding, and

(*c*) Preventive and curative measures against mortality of cattle from diseases.

CATTLE BREEDING.

Mysore cattle were once very famous for their power and endurance and their capacity for hard work. The Amrit Mahal breed of cattle still maintain their fame for swiftness and are largely used for military transport work. The breed and selling of bullocks is a paying industry in the Mysore and Hassan districts. But there has not been any serious organized attempt made on any appreciable scale to develop this useful and paying industry.

Any excellence with regard to cattle is, however, confined only to bullocks. The breeding of milch cows, the importation of good breeds of such cows, and the systematic development of dairy-farming are all matters in which no progress has been made worth mentioning, and there remains still very great effort to be made in these directions. This work may with advantage be entrusted to the Veterinary Department.

A Central Association of cattle breeders in the State should at once be formed in district head-quarters at Mysore and Hassan, the Director of Agriculture and the Superintendent, Civil Veterinary Department, being obligatory members. Census should be taken of the number of cattle breeders, the number of cattle in the State under each class of the recognized breeds such as Amrit Mahal, Hallikar, Gujjamavu, Bettadapura, Nadudana, etc. Watch should be kept over the number of cattle sold every year and the prices realized, and care should be taken not to indiscriminately sell the existing stock without proper safeguards for increasing it. Central Farms for cattle breeding and cattle rearing should be started in each district head-quarters to serve as (*a*) depôts for people desirous of bringing improved breeds of cattle, and (*b*) models for similar farms to be started in interior stations.

An annual show for the whole State should be organized perferably in Mysore, where all the best breeds of cattle should be represented, the exhibits being both from Government Farms and from among cattle belonging to private owners. More than all even legislation, if necessary, would have to be resorted to, for preventing inferior cattle from spoiliug the breed of good cattle.

Cattle feeding is another prominent factor with regard to cattle. The present arrangement of herding together all the cattle of the village and allowing them to graze on the village *gomal* or in the jungle is attended with very pernicious results. In fact there is no cattle-feeding at all done in repect of these cattle. Stall-feeding is very rarely resorted to and that too in exceptional cases. There are no special efforts put forth to effectively supplement the gleanings the cattle get from the village green. In most cases there will not even be green *gomals*; but bleak hill tops and impossible fallow fields with absolutely no vegetation form the feeding ground for these dumb creatures. There is thus very little wonder that cattle in most villages are out of condition.

RECOMMENDATIONS.

(1) Special crops for feeding cattle should be advised to the ryot by means of lectures and printed leaflets.

(2) In District Farms such crops should be raised and cattle fed on same, showing thus practically the benefits derivable therefrom.

(3) Special prizes should be offered to ryots growing fodder for cattle and even to stall-fed cattle.

(4) Arrangements should be made for supplying to the people through the several Agricultural Associations artificial feed for cattle.

(5) Depôts for the sale of such feeding stuff should be opened in each district head-quarter.

PREVENTIVE AND CURATIVE MEASURES

This is a very important matter. Thousands upon thousands of cattle are dying every year owing to the outbreak and spread of preventable diseases. Rinderpest, blackquarter and other diseases have been rather of too common but very sad occurrence. The existing veterinary staff is too inadequate to cope with the situation. One stationary Inspector for a taluk may not be able at all to attend at all places where there may be outbreaks simultaneously.

A mobile corps of Veterinary Inspectors with necessary equipment and paraphernalia would be necessary for each district even after establishing a Dispensary in each taluk. Popular opinion is very much in favour of veterinary aid being secured as early as practicable. People are even willing to tax themselves and thereby find the necessary funds to meet the cost of these dispensaries. Remarkable instances of real enthusiasm and an honest endeavour to ameliorate the condition of their cattle by means of timely veterinary aid, were afforded at the last year's conference, when practically every taluk, in the Shimoga District was willing to tax itself if necessary, provided only the Government sanctioned one Veterinary Dispensary at least for each taluk. This shows that popular prejudice, if any existed, has begun to wear out, and a beginning may be straight made at least in those taluks, in which the people have thus signified their willingness to co-operate with the Government.

The necessary cost of equipment including medicines may be left to be borne by the people, the pay proper of the staff and even their travelling allowances being borne by Government.

Popular lectures and demonstrations with regard to the more frequent diseases of cattle and their cure could also be arranged to be conducted by a mobile corps for each district. The staff of this corps should be available for such work whenever there is not any special call for attending serious outbreak of epidemic.

An appeal to the natural feeling of veneration which the Hindu cherishes to the cow and for that matter to cattle in general will never fail to be responded, and even the least effort on the part of the lecturers will be amply rewarded by ryots and influential non-official agencies coming forward to co-operate with Government for establishing fresh dispensaries. Gorakshana Sabhas are voluntary organizations in Bombay and such like important Indian cities. Practically every shop in Bombay has a dole-box of the Gorakshana Sabha for the customers to contribute their mite. And even in our own State, it should be easy to find voluntary agents to take up this work, of supplementing the Government's activities by finding extra funds either to stall a large number of such cattle or to amplify the resources of any particularly popular and useful dispensary.

An argument is put forth that the existing dispensaries are not sufficiently popular inasmuch as in many cases the average

daily attendence is not large. But this statement loses all its force when it is considered that many a villager does not know even the very existance of a Veterinary Dispensary in his midst, and that the usefulness of these dispensaries will only be apparent on the following conditions :—

(1) Wide publicity should be given to the fact that such dispensaries exist in specified places, that these dispensaries work during specific hours and that the treatment is gratis.

(2) Each village Chavadi should contain a printed notice to this effect, and

(3) Each dispensary should be in charge of two Assistant Inspectors, one whom will be itinerating within a radius of eight to ten miles while the other will attend to cases at head-quarters.

In short, the willingness for the ryot to co-operate with Government, in affording veterinary aid to cattle exists, and will continue to do so, as long as the Hindu has any reverence for the cow and its species.

The main thing that is required to be done is to go to the ryot and tell him what is required of him even if it be in the shape of contribution towards the cost of any dispensaries or hospitals for cattle. More men with adequate knowledge and sympathies for the Mysore ryot, more dispensaries, more hospitals, and above all, wider publicity among the people of the fact that veterinary aid is available, these appear to be the main ingredients for securing popular co-operation and even active participation in the efforts of the Veterinary Department.

FAILURES OF DAIRYING.

BY M. AMINUDDIN ALI.

MILK is a highly complex fluid, beautifully designed by Nature to nourish the offspring of mammals that produce it. This boon of Nature has the disadvantage that milk as milk has very short life. Man has not only found out uses of milk for himself but has overcome the disadvantage by converting milk into products of longer life and concentrated form capahle of leisurely use and easy transport. This conversion is done in two ways, *viz.*, by machinery, into cream (for butter-making) and skimmed milk; and by hand into butter (for ghee-making) and curds. Butter and ghee which form a small percentage of milk, have long life and are the products aimed at. Skimmed milk and curds, which form the bulk, have short life and are waste products as it were. They are also consumed by man, but they should be consumed without loss of much time. Owing to their bulk, cheap value and short life, they are incapable of bearing cost and time of transit and hence should be consumed in or near the place of production. Milk produced in or near populous centres is consumed in one form or other by human beings to the advantage of the milk-producer. Where milk is produced in rural parts farther from populous centres, which is the bulk of milk-producing area generally, there is no demand for local consumption of milk and its superior products, hence the milk producer converts his milk into long life products for export and gets its value, the waste products yielding notbing to him. The problem of ryot's welfare resolves itself into this form, "The milk-producing ryot will be benefited to the extent to which the waste products of milk in rural parts can be converted into money."

Between Dr. Lamuel Joshi's "Milk Problem in India"—a very comprehensive book on the subject—and Bulletin No. 9 of the Department of Agriculture of Mysore State—a mere pamphlet—there are several books but none dealing with the solution of this problem. Science has disclosed the existence of *Casein* in skimmed milk, but no such advantageously workable thing in curds. Extraction of Casein—which exists in milk in very small portion—is a very recent discovery, information on the subject in the Press is very rare, and processes are almost impenetrable trade secrets protected by patents. Advantage to the ryot in the line of milk lies in this quarter only. Neither the ryot has taken this advantage nor any body else has given it to him yet.

Last year circumstances forced me to seek a new field of activity and I hit upon Dairy business for the reason among others, that there exists in it much scope for philanthropy—a passion that instinctively outweighs considerations of self-aggrandisement at later stage of one's life. I learnt dairying, secured the outfit to start business on a modest scale, and succeeded in extracting commercial casein. In the middle of December last I deposited myself with all my plant and tool at Kilanpura, a roadside village, twelve miles from Mysore on Mysore-T. Narsipur Road. I then collected definite statistics of milk-yield within a radius of easy reach and timely transport to this centre, ascertained the selling rate of milk and its products at different seasons of the year, tested butter and casein yield, fixed a price for the milk, reserving a small margin to cover working charges and profit and a big one for the ryot, and offered to take milk for cash or against reasonable advances. I believed every thing would be smooth for me from here but my efforts came soon to a *full stop.*

The factors that came in the way to defeat my object may be classed under the following four heads for separate treatment to give a clear idea to a reader not having personal experience of conditions of life in rural areas :—

(*a*) Absolute ignorance, wretched contentedness, or ruinous conservatism—whatever name the educated may choose to give to the quality inherent in the ryot.

(*b*) The influence of the housewife over the husband in matters pertaining to milk and the causes of reservation of her rights.

(*c*) The interest of the butter collecting itinerant agent and his indispensable services.

(*d*) The inborn nature of the local oracle, the Yejman of the village, his influence and methods.

The Ryot.—One seer by measure of buffaloe's milk yields about a quarter seer by weight of butter. This average exceeds by a small percentage in rare cases, where the animal is given special ration. This fact is established by researches of Science experts and recorded by tests made by the Agricultural Department in the State. The ryot has never in his lifetime measured the milk and weighed the butter extracted from that, for fear of animal drying or dying soon after such test, as in many instances related to him by his grandmother. The buffalo, his wife's pet and hence his pride, gives milk that yields seer to seer butter, and nothing can dissuade him from this belief. He sells butter at four seers per rupee and this quantity he makes out of sixteen seers of milk, but if asked to sell milk, any lesser quantity than sixteen seers per rupee and thus save time and trouble to churnwoman and make profit, he refuses. He knows that milk sells dearer in cities but is incapable of imagining why it sells so and why he could not compete there and earn. With this knowledge as basis to fix price, he offers half a seer over and above city rate and nothing more. No argument or reasoning can push the matter further. If the dairyman sticks on any

longer with all the tact and patience in him the ryot gets reinforcements of housewife, the yejman and butter agent in the meanwhile. The argument that did not work upon one man, the ryot, could not convince him plus his three allies, to whose interest a bargain is adverse. The dairyman gets no hearing in the blabber of several voices and is forced to quite tired of the affair. After that, the matter is discussed by groups on pials and under trees as the burning question of the day. The dairyman goes to the village next day, vainly hoping that the ryots might have returned to reason after thinking over the matter coolly, but instead there is an infection and a scare. No inducement of fair dealing, profit making, cash payment, advance payment, salvation from the follies of the housewife, from the rapacity of the agent and from the clutches of the *yejman* make the ryot to approach the dairyman with feeling of goodwill and trust. The housewife is unapproachable, the agent is in advance to warn the villagers of a demon's arrival and the yejman is there to paint the devil in pitch and tar. The dairyman has to try his luck in some other village to meet the same fate.

Housewife.—Any woman in the family—whether wife, sister, daughter-in-law—living in the house permanently and in charge of milch-cattle and milking operations is to be understood by this name. The Press and pulpit add the adjective hard worked to the name ryot. If the period of hard work is to be the criterion for the award, it may be rightly said that the qualification is shifted from the arms of the housewife and placed on the shoulder of the ryot. It is the wife that toils all round the year from before sunrise to after sunset all through, whereas the husband works only during cultivation season, which is a mere portion of tbe year, and the rest of the time spending on pials or elsewhere talking, moping or sleeping. The husband earns the bread for all by his labour during the cultivation season and the wife looks after herself, her husband, the rest of the family aud cattle stock at home all round the year. The husband does not give her any pin-money, perhaps he has taken a vow for it. She has to earn it. What she earns openly, she has to give away to her husband. She is therefore forced to earn without her husband's knowledge if she has to earn for herself. She is far from earning by infamous methods. These circumstances force a new code of morality on her, and in her ethics she is morally convinced that when she sells four seers of butter on family account, she has a right to sell a little "quarter seer" or so, on her own account, to enable her to purchase a bodice, like one worn by Kempi, when she goes to Mysore next *Navaratri.* My Lord, in honor bound, in exchange for relief of labour, has handed over to my Lady, the milk Department in toto, except the right to receive the sale proceeds of butter offered by her and my Lady has cheerfully taken charge with reserved right of pin-money, known to both parties but not admitted by either. Invariably the butter-agent has his transactions with the wife behind the back of the husband and if by chance the latter should happen to be present it is by implied mutual consent to be his corporeal body and not the conscious body. The shrewd agent seeks such opportunity to serve his purpose, and the foolish housewife too seeks it for the like purpose, whereas it is the thoughtless ryot that is the victim in the long run. Thus hedged in the husband bows his head to the mandate of his merry wife, that her buffalo yields milk that gives seer to seer butter, that selling milk as milk is ruinous, that if milk is sold away the children will die for lack of curds in the dietary and so on. The husband belives in such gospel truths, acts on them and refuses to sell milk to Dairyman.

The Butter Agent.—When no more than four seers of butter per rupee is to be had in villages, it sells in the city at three and

three-fourths seers though Octroi duty, transport charge, agent's labour value, work up far beyond the margin of one-fourth seer. Butter holds water and is not capable of adulteration as much as ghee. In spite of all these disadvantages, with such slight difference in buying and selling prices, where is the margin of profit and how do city ghee merchants become Sowcars soon, though the agent can afford to lose something in gambling in the village? The clue is not far to seek. The scales, the weights, the advance rates, the accounts in memory, the mental calculations, the price of exchange articles, the transactions between a pedlar and a home-struck woman, all these circumstances contribute to sacrifices of the ryot through his pennywise and pound-foolish wife and go to make butter sell in cities with slight difference. The scales in the hands of the agent, does such wonders as the wand in the hands of the magician does in sleight-of-hand tricks. The weights—two smooth rounded stones found in river beds, called half seer and quarter seer weights—are of the standard of agent's honesty and even a large quantity of butter is to be weighed with these small weights several times. The purchase rate has the very small margin of 25 per cent per mensem to cover loss of interest on advance amount. Some may not believe the above figure of 25 per cent per mensem, but the difference of quarter seer per rupee against advance for a week, the turn over works up to four annas per rupee per mensem by simple rules of arithmetic all know. In many instances he does not pay the advance in cash, but in cotton seed and husk powder. He retails big cotton seed at small seed price, adding transport charges and the so-called little profit, which if it should even be cent per cent, the villager has no means of finding out. He buys husk powder from rice mills, takes away all the minced rice out of it and retails the powder with additions as on cotton seed. A balance of two seers and three paos at the close of one transaction opens the ledger in memory with three seers and two paos at the next transaction after a week. Formulæ for mental calculation of value of butter weighed are also of the same type. If the housewife differs from the agent on any point, there is dread of harm, who knows what, she is alone, and apart from that, how to dispose of the butter on hand and get cotton seed and husk powder for the week.

The Yejman.—He is also the self-imposed head of the faction invariably in existence in every village. You approach him and it is only then that he takes you to the biggest pial of the biggest house which you will afterwards learn to be of some body else. He speaks of his constructive authority and destructive insubordination of his flock, copious yield of milk and great demand for local consumption, his honesty and ryots' tricks, his wisdom and their ignorance, in fine, a paradise in one palm and a hell in the other. Simultaneously he pumps you out. He also forces you to believe that if you go through him all the milk in the village is yours for the asking. You push him to point of business but he grows solicitous of your dinner hour, escorts you alone to some distance and there does the real business of enjoiniug upon you the absolute necessity of doing nothing with the ryots yourself direct. He accepts rates and enters into contract on behalf of the village. You return home satisfied. Some milk comes next day and the carrier brings word to send money with him for advances. You find the milk very thick and rich in cream and half a seer more than what the carrier said. You go over next day with money. Yejman is very busy and could not sit down, so imparts to you standing that he has engaged a young man (his son) to keep accounts, an old man (his father) to carry milk, an upright man (his brother-in-law) to collect and test milk; that he has spoken to all the ryots, ninty-nine parts are

already won and money will make the hundredth. You drop the money into his hands and he immediately confers upon you the title of Sowcar, out of the list of his kitten's birthday honors. Just then he remembers that he has to go to his Guru, the interview closes and you return home. Milk comes late and measures half a seer less. You send word. Next day, in addition to previous day's defects milk is diluted and you send word but no reply; you yourself go but yejman has gone to some village. You go again and again and catch him one day and begin to enumerate the shortcomings but before your list of complaints is exhausted, he cries you out of order and reminds you thus: " Did I not tell you in the beginning alone, that the people in this cursed village are insubordinate, unreasonable, etc, etc., and what not? We have to bring them round gradually and with tact. City methods will not succeed here. The worst of it is that the ryots have taken into their heads that you will not stay here permanently. There is a land for mortgage, free from any the least trouble (afterwards you learn that it is *yejman's* own, with three prior mortgages, ancestral property of an undivided family consisting of minors) a very good bargain, many want to go in for it, but I can arrange it for you." You feel bored and refuse the offer and at once you are deposed from the Sowcar's pedestal. You are gratuitously advertised by *yejman* as an insolvent black sheep from the city, come to plunder the village, that dairy business is the thin end of the wedge to introduce tax on milch cattle and milk products and (in a low voice) to collect recruits for war and other purposes. Implied challenges ripen into direct and open ones. You press him to settle accounts and he cries out " Am I a rogue? Have I eaten away your money? All is advanced; find it out from parties yourself; recover it from them in milk; I am not expected to remember all that and to recover from them." You have lost in lump and each ryot has lost something. The villagers are under the impression that they have supplied you with milk but you have not paid for it as said by *yejman*, and you are under the impression that your money is with the ryots. This attitude between yourself on the one side and the ryots and their head on the other, forces you not to enter into the village again. You leave it for good with an *adda*, pots, measure, and pales in addition to money.

The Socialist cries out that the lot of the masses should be ameliorated; another lectures that village system should be organized; and still another preaches that the masses should be educated; the co-operator harangues that co-operation must be introduced. Kaundinya advocates that improved methods of agriculture should be universally demonstrated; the milk expert publishes that cattle breed must be improved and the State wishes that ryot should grow prosperous and happy. I am neither an apologist nor an antagonist of these sermons and wishes. From the standpoint of the limited sphere of my activities, I would say, let the lot of the ryot be ameliorated item by item, step by step, and spot by spot. The Agricultural Department commends the starting of co-operative diaries throughout the State. When the ryot is incapable of realising the advantage of selling twelve seers of milk per rupee instead of labouring with sixteen seers to earn that rupee, his intelligence has to cross black waters to grasp the idea of co-operation. The same Department has also recorded its experience that in diaries owned by enterprising individuals "the ryot usually has the upper hand in the transaction and cases are known where ryots have refused to sell milk at rates which will leave a margin of profit to the buyer who has consequently had to shut down and move the separator to more favourable localities" The whole passage must have recurring decimal marks along with inverted commas, for repetition in case of every diary without exception, since the enterprising

individual has to move the separator from one more favourable locality to another—and there is no end of such localities—localities where the ryot learns that very next day after your settlement, how to have the upper hand in the transaction. The interest of one enterprising individual is in no way less than the aggregate interest of several ryots. Instances of failure of dairying are more than those of its success. This statement does not count Government Dairies worked to meet the demand of Troops at any cost and such other Dairies worked by organizations to meet the demand of the public at any sacrifice of dividend. Co-operative Dairies by conservative and ignorant ryots will never see the face of the sun unless and until dairies started by enterprising individuals should force their existence and advantage upon the dull attention of ryots. No enterprising individual, however persevering, self-sacrificing and philanthropic he may be, will sustain his enthusiasm and work longer than possible limits of his stock of funds, energy and prospects.

In the light of all the above stated facts, the remedy is to come from official quarters. Dr. Joshi has gone to the extent of emphasizing the necessity of the intervention of the legislature to solve the milk problem, but where the problem of ryots' welfare can also be solved along with it, the intervention of official influence becomes imperative when nervous patients among the educated prefer to suffer excruciating pain from an abscess to having immediate relief by a surgeon's lancet, it is too much to expect the callous ryot to come forward to ameliorate his condition at his own instance. The ryot as a rule distrusts a stranger, however good the latter's intentions may be, and takes at a discount every new scheme, however beneficial to him it may be. If he has any faith, he has it in the *Sircar*. The authorities must, therefore, come forward, determine the margin of profit to the dairyman and to the milk supplying ryots, fix rates on that basis, bind either side for the due performance of mutual obligations and safeguard the interests of both sides. The efforts of authorities must not be half-hearted and spasmodic but of the one-thing-at-a-time and-that-done-well nature. Necessary exercise of official intervention, influence and control within permissible limits will not only help the achievement of the object aimed at but will also remove the harms of the unscrupulous agent and *yejman*. When once the experiment succeeds there will be no lack of dairies by enterprising individuals and in their train dairies by co-operation of appreciating masses. There are villages situated so far from cities that milk or curds cannot be transported for advantageous sale. In such villages the milk producer makes rupee out of butter from a certain quantity of milk say twelve seers. To him selling ten seers a rupee is a gain both in money and in saving of labour. No dairyman can work profitably eveu buying milk at this rate in rural parts where skimmed milk or curds cannot be disposed of unless he knows to convert skimmed milk into casein. The larger the quantity of milk supplied to the Dairy, the cheaper the cost of collection and working into cream and casein. The regularity and punctuality of supply help the dairy work to a great extent. Disproportionate advances to the ryot give him the upper hand to practise unfair means. Such advances in the hands of the middlemen are worse for all sides. Weekly payment after supply, even for a quantity of 600 seers *per diem*, does not come up to a sum difficult of recovery from the dairyman but the same amount advanced to hundred ryots is not only difficult but tedious of recovery. Responsible and scrupulous members in each village should be chosen and nominated by the authorities to hold the scales between the dairyman and the ryots; of course, the labour of such members being gratuitous on the side of the community and carrying an honorarium on the side of the diaryman. The conduct of the ryots, the middlemen and the diaryman must be under check and control of the authorities, *i. e.*, Shanbhogue and Patel checking over ryots, Shekdar over members acting as middlemen and Amildar over Diaryman.

ECONOMICS IN THE WEST.

India's Industrial Development.

London, September 19, 1918.—Sir Ratan Tata's lamented death has brought to a close a useful life which could be ill spared at the present stage in India's industrial development. Like his father he was a man of exceptional resource, was inspired by high ideals and steadily pursued the aim he held through life of promoting the commercial greatness of his native land. Such leaders are rare in any country and they are especially rare in India where the bonds of an ancient system and of an immemorial Conservatism impede progress as the term is understood in the West. Happily his example survives to stimulate the ardour of the young Indian mind now burning with zeal to give India its rightful place amongst the industrial nations of the globe.

More than ever industrial advancement is the keynote of the aspirations of the Indian patriot. It was sounded in no uncertain way in a statement which Sir S. P. Sinha made at a Conference of Overseas Press representatives a few days ago. His postulate was that India is a poor country and that its loyalty to the Imperial connection is bound up in making it prosperous. A good many perhaps will be disposed to join issue with the Indian Member of the Imperial War Cabinet on his argument that "without increased prosperity it was useless to expect India to be either contented or loyal to the connection with the Empire." Prosperity is a relative term and it may be that the Indian ryot with his modest needs and his freedom from the harassing strain of life in the advanced communities in the West will be found more contented with his lot than the wage earners of other parts of the Empire whose material position is infinitely more advantageous. If modern history shows anything, it shows that contentment and high pay do not always go together. For example, at the present time, the working classes here are enjoying a spell of unexampled prosperity; yet there has not for a long time past been a greater under current of unrest. Still Sir S. P. Sinha is undoubtedly right in insisting on greater attention being paid to material progress in India than in the past. The *laissez faire* methods which he condemns have kept India in industrial leading strings and we need to abandon them in favour of a policy more in harmony with the spirit of the age. The great natural wealth of India must be developed on modern lines and the Government must take a prominent part in the work. As every student of Anglo-Indian history knows, and as I have before shown in these pages, this will mean no new departure but rather a reversion to the old conception of the stimulation of industry by official action and experiment on scientific lines in suitable directions. As the tin industry was created directly by Government initiative so may other equally valuable new industries be brought into life if proper use is made of opportunities and of the powerful resources which the authorities have at their command. When the Industrial Commission's report is forthcoming we may confidently expect that it will have something practical to propose on this subject.

New Paper Making Material.

The search for new paper making material is taking our experimentalists into some unaccustomed byeways. Recently the Imperial Institute has been making a series of researches into the properties of various grasses from South Africa, the Federated Malay States, Australia and St. Helena. Samples of "tambookie" and similar grasses from Pretoria gave a high yield of pulp of good quality capable of conversion either into excellent brown paper or (after bleaching) into white paper. But perhaps the most promising material under examination was lalang grass from the Malay States. Lalang

grows abundantly in Malaya and is regarded by planters very much as a noxious weed owing to its persistence in the rubber plantations in spite of measures adopted for its extirpation. Yet it is found to compare very favourably as a paper making material with esparto grass from Algeria though it does not come up quite to the standard of Spanish esparto. Bamboo grass from the northern territory of South Australia also yielded good results. In short, the series of experiments clearly demonstrated that there is an encouraging opening for the profitable utilisation of many luxuriant growths in the remoter parts of the Empire—growths which hitherto have been of little or no commercial value. In this matter India ought to be able to take a good share of the profits which may result from the widening of the paper makers' search for fresh raw material. At all events if Australian bamboo grass can make a showing in the new picture, the Indian product of the same type cannot be far away.

THE RUBBER OIL.

For a considerable time past experiments have been proceeding in the Federated Malay States with a view to the discovery of a process by which the seed of the rubber tree may be made available for commercial purposes much as cotton seed is. According to the latest reports entire success has attended the efforts of the British Malayan officials. From the seed an oil has been produced of such a high grade as to require little refining while the residual cake is of value as a food for cattle. An experimental consignment of 30 tons of seeds sent to England resulted in £50 per ton being obtained for the oil while £8 per ton was realised for the cake. As the £50 per ton for the rubber oil contrasted with £60 per ton secured in the market at the time for linseed oil, the price may be regarded as very satisfactory. The expectation is that in the not distant future rubber oil will occupy a place but little inferior to linseed oil and if this should prove to be the case quite a new aspect will be given to rubber cultivation. In any event the demonstration that a saleable oil can be readily extracted from rubber seed is of much value. At present the seed is a mere waste product. It is obtainable in great quantities and can be readily collected. The rubber oil will be the more acceptable just now as rubber itself is under a temporary cloud owing to the congestion of supplies and the consequent deterioration of values. The fact that apart from rubber the industry has great possibilities will help to stimulate the weak and strengthen the strong in the conviction that the plantation rubber interest has a great future before it in spite of present appearances to the contrary.

EMPIRE SHOP WINDOWS.

A few days ago an interesting article appeared in the *Morning Post* under the title of "Empire Shop Windows." It dealt with the window displays by the great Dominions and Colonies of their peculiar products. How enormously interesting these are was the theme of the writer and he pleasantly illustrated his remarks by some apt allusions to the historical import of the displays. Reading the article I was reminded, as I have often been reminded before, that amongst the great members of the Imperial family India is the only one that is unrepresented in these "Empire Shop Windows." There may be some sound reason for the omission, but I am afraid that the explanation is that official aloofness from the realities of life and especially of commercial life which has been only too painfully revealed in the history of the war. Actually the Government of India is as much interested in promoting the material interests of India as Canada is in helping the industries of the Dominion. And if it pays Canada to subsidise a shop window and if it is not *infra dig* for her Government to advertise her wares, surely it would be equally profitable to India and in no greater degree derogatory to her Government to do so. "Sweet are the uses of advertisement." We have abundantly discovered that in the course of the war, and the lesson thus acquired will not be lost. Whether some of us like it or not the day is coming when all governments will advertise as a matter of course like any great commercial undertaking that has to court the favour of the public. The shop window with characteristic samples may, indeed, be quite a mild form of making the appeal to the public eye which will ultimately be adopted.

ARNOLD WRIGHT.

INDUSTRIAL NOTES FROM THE UNITED STATES.

Electricity Hazards.

Washington, D.C., U.S.A., October 12, 1918.—One of the interesting problems that the experts of the United States Bureau of Standards are working out is a study of the life hazard in electrical practice and in the preparation of the national electrical safety code. In this work the bureau experts have had the co-operation and assistance of a large number of engineers, many of whom are connected with the electrical operating and manufacturing companies, others being engineers and inspectors of state commissions and municipalities.

The importance of having a national code uniform in all the states is realized by those who are making the study of the situation to be quite as great for accident-preventiou rules as for fire-prevention rules, and the advantage of having such a code prepared and presented by a national agency that can study the subject thoroughly and consult all the interests affected is very obvious.

The safety code consists of four principal parts: 1. Rules for the installation and maintenance of machinery switchboards and wire in central stations and sub-stations; 2. Rules for the construction and mintenance of overhead and underground lines for the transmission and distribution of electrical energy and intelligence; 3. Rules for the installation and maintenance of electrical apparatus and wiring in factories, residences and wherever electricity is utilized for light, heat or power; 4. Rules to be observed by employes in working on or near electrical machines or lines.

The code is intended to be adopted by state industrial and public service commissions and municipalities and to be complied with by all public service and industrial corporations. It is also intended to be adopted voluntarily by electrical interests when the code has not been adopted by any administrative body having jurisdiction in their district.

Saving Billions From Smoke.

America sends billions "up in smoke" yearly because of the enormous waste in the fuel used by our industries. On the other hand, there is a man in Washington who has discovered how to turn smoke into money, and he is now busily engaged in teaching the rest of the country how to perform the same trick. He does this by means of devices which, through electrical precipitation, not only reclaim vast wealth from the smoke, dust and fumes of smelters and other plants, but at the same time redeem thousands of acres of nearby land. As a matter of fact, the curb which he has put upon the smoke and dust nuisance—his original aim—now actually bids fair to be, in some directions, the primary reason for the running of certain of our industries. The smoke wizard who has accomplished these remarkable things is Dr. Frederic Cottrell, chief metallurgist of the U.S. Bureau of Mines.

Dr. Cottrell's experiments began several years ago when, as a member of the staff of the University of California, he was called upon to solve the problem of helping a smelter located on San Francisco Bay. The waste gases and vapors from this smelter, resulting from the sulphuric acid parting process used in treating gold and silver bullion, were declared a nuisance by neighboring farmers and seemed likely to provoke costly litigation and possibly lead to a shutdown of the plant.

The gases discharged into the air amounted to substantially 5,000 cubic feet per minute and held in suspension an important proportion of sulphuric acid in the form of a fine mist. The corrosive action of the acid, swept broadcast by the shifting winds, was felt throughout the entire zone and both the agriculturists and the people

mines. Probably, as suggested by a well known seismologist, earthquake waves are of relatively smally amplitude at great depths on account of the great weight of the overlying rock. It may be added, too, that a special type of earthquake appears to be caused by mining operations and seismographs have been installed in certain mines in Belgium and elsewhere for the purpose of studying the phenomenon.

MAKING RADIUM CHEAPER.

As the result of an agreement between the National Radium Institute and the United States Bureau of Mines, Department of the Interior, to develop a more efficient process for the manufacture of radium from the carnotite ores of Colorado and Utah, the bureau now has as its share more than $180,000 worth of radium for use in the sciences. This was secured for the expenditure of about $37,000. In addition, under the agreement referred to, the bureau of mines has turned over to the National Radium Institute about 63 grammes of radium, and has given to the country a method for producing pure radium compound from the ore for as little as one-third the current price of radium.

When the Bureau of Mines began this work in 1912 it found that the precious carnotite ore, constituting the largest known supply of radium ore in the world, was rapidly going to Europe, mainly to Germany, where it was being turned into radium and then sold back to the United States at fabulous prices.

ELECTRICAL DETECTION OF ORES.

A recent U. S. patent refers to the locating of deposits of ore by electrical means. Bore holes are made in the area under investigation at a distance of several miles apart. Four such holes would be bored, say, five miles apart, and the apparatus used would consist of a sound oscillator and three recording oscillographs. The holes are filled with water, in which the sending oscillator and the receiving microphone are immersed. By studying the records on the oscillographs, and particularly the relation between sonnd received direct and through echoes, it is possible to form conclusions as to the nature of the intervening rock and the distances of ore deposits in the vicinity.

ALFRED T. MARKS.

NOTES.

In the December number of this *Journal* we published the best part of the speech of Mr. Lloyd George on re-construction after war. The speech is one of the most remarkable delivered by the Premier. It is characteristically fresh. His formulation of what should be done is not the least important portion of the speech. What are the lessons of the war and how best to practically utilise those lessons for the good of the nation? What has the war laid bare as the weakness of the nation and how best to combat it? What are the duties of a statesman in the light of what the war has taught us and how best to accomplish them? These are some of the problems that Mr. George attacks in the speech. The nations' health, the importance of the home, transport problems, the need for co-operation among all classes—these and other subjects are tackled by him in a masterly fashion. Housing of the poor, improvement of health conditions, improvement of communications in rural areas are all urged by him as remedies for the present unsatisfactory economic position. The speech is not without intererst to us in India. It shows on what lines progress is likely to be achieved by Great Britain in the coming years. What Mr. Lloyd George says of England is, perhaps, applicable ten-fold to India and a hundred-fold to Mysore. Our death-rates, our honsing conditions, our lack of communications are all too well known to need re-iteration now. The remedies that Mr. George proposes are none of them of the heroic type. He means business and so would tackle questions in an earnest spirit. He says:—"I deal not with plans, not with details and above all not with programmes. I am sick of programmes. I deal with what are called, in military language, objectives, something which you mean to get at with all your artillery, with all the weapons in your power. These objectives we ought to

get at, and if we agree as to objectives, do not let us quarrel about methods. Let us keep one people until we get there." That is a characteristic utterance. It conveys a message the world over to all interested not in discussion but action.

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In the address that Mr. Raitt, Cellulose Expert to the Government of India, delivered at Calcutta the other day, there are given some interesting facts and figures about paper and its manufacture. Among other things, Mr. Raitt announced that the nodes or knots of the bamboo which have so far resisted all digestive liquors, can be overcome by the simple operation of totally destroying and opening out their structure by crushing. This has been talked about for sometime in paper manufacturing circles but this is the first time that an authoritative pronouncement has been made on it. If the nodes can be got at in the manner suggested, and if the resistance of the bamboo to efficient and economical bleaching is also possible as Mr. Raitt suggests it is, then, the problem of the manufacture of paper from bamboo is, so far as the technical side is concerned, practically solved. But other difficulties from the manufacturer's point of view, however, still remain. These are raw materials, and manufacturing facilities in or near the raw material forests. Both of these are of primary importance; the one without the other is of little use. Mr. Raitt demonstrates this in telling fashion in his address to which we would refer our readers. His address is of immediate practical interest to us in Mysore because for sometime now the question of a Paper Mill for manufacturing paper from bamboo has been discussed here. The war did not allow of the importation of the necessary machinery so far; but now that the war is over and import facilities are better, it seems opportune to press forward with this matter. In large undertakings of this kind, the best and latest machinery available should be used. Qualified men should be brought out and employed and all the conditions requisite for business success of the venture should be assured. In Mysore, we have certain of these conditions already and for the rest, all that is now needed is increased attention.

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The Mysore Government have issued a further communique modifying in certain respects their orders in regard to food control. The primary idea underlying the new circular is that as little trouble as possible should be caused to the trade, while profiteering is checked and a steady supply of essential food-stuffs is made possible in the State. The new circular will take sometime to filter down but when it does, it will doubtless go a long way in easing the situation. Merchants and traders have, as soon as they understood the basic ideas of the Government in the matter, come round to take out the necessary license. They appreciate better now that the licensing system is essentially in their own interests and that it is intended to do away with intruders in the business. The Government will doubtless in time do away with certain other features of the original scheme but for this a little more patience on the part of merchants and traders is necessary. The export of food grains from the State to outside areas with a view to profit while a number of people within it are going without them has to be stopped and this cannot be done until the cordon is drawn still tighter than it has been so far. When this is done, the simplicity of the scheme will be perceived in its true lights and there is sure to be less talk about it—or rather against it—than it has been up to now.

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Bulletin No. 84, just issued by the Agricultural Research Institute, Pusa, is entitled "The best means of rapidly increcsing the outturns of Food Crops by methods within the power of the Agricultural Department." The material presented consists of notes submitted to the meeting of the Board of

Agriculture in India held at Poona (1917), edited with an introduction, by Mr. J. Mackenna, C.I.E., I.C.S., Agricultural Adviser to the Government of India. According to Mr. Mackenna, the methods by which the produce of a country can be increased fall into two classes:—In the first place, the food supply of a country may be increased by substituting food crops for fibre or other non-food crops or by the breaking up of new lands formerly not under cultivation. These, however, are rather administrative questions dependent either upon the arbitrary order of Government that cropping should follow a certain scheme or on the availablity of waste lands formerly uncultivated. The second group of methods which more properly come within the scope of the Agricultural Department are:—(1) introduction of improved varieties, (2) manures, and (3) better cultivation. In the papers which apper in the Bulletin the efforts of the various Agricultural Departments along these lines are recorded. "It must be remembered," says Mr. Mackenna, "that there are considerable limitations to the use of manures. There are also limitations to extensive cultivation on account of the shortage of cattle, while it is probably dangerous to suggest revolutionary changes in well-established schemes of rotation. Advance along these lines must be gradual and the most hopeful prospect of a rapid development depends on the evolution of improved high yielding varieties of crops such as the Pusa, Punjab and Central Provinces wheats and Bengal, Madras, Central Provinces and Burma paddies, combined with an effective organization for the rapid dissemination and distribution of these improved varieties."

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His Majesty's Trade Commissioner in India has received from the Department of Overseas Trade various lists of new Industries that have recently been developed in the United Kingdom. These lists contain the names of Manufacturers of various articles, the production of which was not carried on in the United Kingdom prior to the war, or which was carried on to an inconsiderable extent only. The following are a number of the articles included:—

Ladies' Hand Bags and other similar fancy goods.
Frames for Ladies' Hand Bags.
Galalith Substitutes.
Fibre Suit Cases.
Metal Fancy Goods—Fancy Nickel and Brass Goods such as Perpetual Calendars, Ink Stands, Match Stands, Letter Balancers, etc.
Cheap Metal Cigarette cases.
Metal Photo Frames.
Cheap Metal Framed Mirrors and Nickel plated Shaving Mirrors, Boxes for Shaving Soap Sticks, Soap Boxes, Clinical Thermometer Cases, Furromes for Walking Sticks and other drawn and stamped articles.
Brushware.
Celluloid, Galalith and Corrozo Nut buttons.
Press Studs Push Buttons.
Hosiery Needles, latch and beared.
Wurtemburg Plate.
Cheap Spoons and Forks.
Rolled Gold Wire and Flat Stock.
Machine made fine chain.
Gramophone Motors, Needles and Sound Boxes.

Textiles, Clothing, etc.

Textiles—Glove fabrics—cotton, knitted.
Moquettes.
Needlework Canvas—penelope, congress, etc.
Silk piece goods for ties.
Slipper cloth—imitation Camel hair.
Tapestry—cotton.
Mixture yarns—Cotton and wool.
Clothing, etc. Fezz Caps.
Fabric Gloves.

Hardware.

Wickless Oil Stoves.
Blow Lamps.
Automatic Mouse Traps.
Nickel Plated Steel Sheets.
"Stauffer" Pattren Lubricators.
Wood Split Pulley for Power Transmission.

Toys.

Dolls, Metal Mechanical Toys, Soft Toys, Pianoforte Accessories,—Actions; Wrest Pins.

Chemical Porcelain and Glassware; Aniline Dyes, Alizarine Dyes, Synthetic Indigo; Synthetic Drugs.

Sanatogen; Lysol; Thymol; Synthetic; Rubber Sponges, Thermit.

Rubber Goods.

Sponges; Leather Substitutes; Tabs and Collets for Ladies.

Suspenders; Vulcanite Pipe Mouthpieces; Teats; Erasing Rubber.

Flooring and Tiling; Compressed Asbestos Fibre Jointing.

Typewriter Accessories.

Carbons, Ribbons and Spools.

Embossed Wall Pockets,

Lead Pencil; Iris or Pearl Paper; Letter Files, metal parts for; *Blocking foils for* Cutter Crush work; Sectional paper.

Ivory Boards; Press—Spahn for Insulating; Photographic Paper; Raw and Coated: Cigarette Paper, Filter Paper, School Chalks.

Cigar Bands and Labels.

Margarine; Dried Vegetables.

Arc Lamp Carbons; Pocket Flash Lamps and Batteries; Insulating Materials, Magnetoes; Gas Calorimeters (Junker Type); Wire Netting Making Machines; Nail Making Machinery; Weft Winding Machines, Sewing Machines.

The firms interested in any of these articles may obtain the list of Manufacturers on application to His Majesty's Trade Commissioner (McLeod House, 28, Dalhousie Square, Calcutta).

The following passage we take from the Report by the Government Actuary on the working of the Indian Life Assurance Companies Act, 1912, for the year 1917:—There are at present 68 companies subject to the Indian Life Assurance Companies Act. Of these 44 are Indian, 17 British, 4 Colonial, 2 are constituted in Shanghai and 1 is an American Company. The summaries relating to these concerus are now published in a form which has been found much more convenient than the former cumbrous methods. The particulars of each company's accounts are now set forth so as to facilitate comparision not only with the corresponding particulars of other companies for the same year, but what is frequently more important, with the returns from the same company in previous years. Summaries of all the valuation returns submitted since the passing of that Act are also published, together with fairly lengthy extracts from the triennial or quinquennial valuation statements submitted since the previous year's issue of these returns. The valuation statements are usually of considerl ably greater importance than the annua. accounts, and as in majority of cases it will be another five years before the next valuation falls to be made, it has been considered desirable to publish such portions as would for the next few years clearly show the financial position of a company as last ascertained. The impossibility of ascertaining the relation of liabilities to assets from an examination of ordinary accounts and balance sheets is possibly more pronounced in the case of life assurance than any other class of business, and forms consequently an additional reason for the publication of the more interesting portions of the valuation statements. The returns from the Indian Companies show a marked improvement in many respects. The new sums assured are nearly thirty-five lakhs in excess of the amount in either of the previous two years, and although the amount is not equal to the pre-war

figure it is satisfactory to see such a marked recovery. The total sums assured remaining in force also show a marekd increase and now amount to nearly twenty-four crores of rupees. This is more than one crore in excess of the amount in any previous year. It is interesting to observe the variation in each of the past three years in the ratio to the new sums assured which is borne by the total sums written off from all causes including claims, surrenders, lapses, etc. In 1915, the sums assured written off exceeded the new business. In 1916 they were only slightly less. But last year they did not amount to half of the new sums assured and were nearly one crore less than the 1915 amount. Each year since the Act came into force there has been a decrease both in the expense ratio and in the amount of the sums falling due under claims by death. As was to be expected, the rate of interest earned on these Life Funds again shows an increase. Since the outbreak of war, the net interest rate has increased from under $4\frac{1}{4}$ to over $4\frac{3}{4}$ per cent and a further increase may be expected. This is a very important consideration in view of the fact that Indian Companies issue mainly endowment assurances and under that class of policy the principal source of profit is generally surplus interest.

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The Imperial Economic Botanists at Pusa (Mr. and Mrs Howard) in their Report for 1917-1918 state that the sale of Improved Fruit Boxes to the public, which upto 1916 had proceeded very satisfactorily, has latterly been greatly interfered with by the war. Although arrangements were made in 1916 for the delivery the next year of a large supply of Card Board boxes, punnets and crate wood all the consignments were delayed and arrived at Quetta too late. The consignments of Cord-Board Boxes and punnets from Great Britain happened to be shipped to India by the same vessel which struck a mine outside Bombay and only just reached port. In due course, both consignments arrived at Quetta at the end of the Fruit Season. The crate wood was arranged for in 1916 from two Indian Factories but in each case the delivery did not take place till the middle of 1918 due to the fact that both the Saw Mills were engaged in War work. At the time of writing July 24th 1918, the last of the consignments ordered in 1916 has arrived at and the various boxes and crates can now be put together. It was hoped that the box-boards prepared in India from locally grown timber would be considerably cheaper than similar supplies from Norway, Great Britain and Japan, but this expectation has not been realised. Indian Boards have proved inferior to and considerably dearer than imported material while Railway freights now charged for full wagon loads are enormous. Till more normal conditions of supply and transport obtain and till importation from Norway and other countries is again practicable, it will scarecely be possible to collect any more fruit box material at Quetta. The supplies already in hand are expected to last till 1920 after which no more orders will be sent till after the War. This work is financed by means of Treasury advances and purchases and sale have to balance each other. The system does not, therefore, admit of the holding of large stocks of unsold materials and is quite unsuited to the trade conditions of the present time. As soon as the War is over and the prices settle down, the supply of these boxes will be handed over to a local Agency. The demand is now considerable and the suitability of the various boxes and crates have been thoroughly tested. Railway concessions have been arranged for and are now in working order. The whole question has passed the experimental stage and will be dealt with by the trade at the earliest opportunity. We trust that people down in Mysore will take note of this experiment.

The Season and Crop Report of the Madras Presidency for the agricultural year 1917-18 states there has been a steadily increasing demand for castor seed and oil during the year. It is required at home as a lubricant for æroplane engines, and is being used on an increasing scale in India for lubrication and for burning in place of mineral oils which have become scarce owing to the lack of freight for their import from Burma. Owing to buying for export being controlled by Government, the price at first rose only slowly from Rs. 12-4-0 per bag of 165 lbs. in July 1917 to Rs. 15-8-0 in January 1918 and Rs. 17-4-0 in June. This small increase is not likely to stimulate greatly increased sowings for 1918-19 in view of the high prices of cotton and grains. However, all restrictions on buying castor were removed in July with the result that the price rapidly rose and is now about Rs. 34 per bag. There is money in castor.

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We learn from the *Board of Trade Journal* that the National Association of Raw Silk Industry of Japan has sent a representative to the United States to study the silk conditions in the country and keep the Association informed on all matters pertaining to silk. The Japanese Association was founded in 1915, with the view of becoming the central organisation of many similar local associations. Its establishment being sanctioned by the Raw Silk Industry Act, it is a public institution, to which all local associations in Japan are compelled to join by the law. The objects of the Association, states the *American Silk Journal*, are to bring unison among organised associations, to develop the export of raw silk, and to increase the interests of the raw silk industry. Here is a useful hint to us in Mysore.

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Since 1916 the Hides and Tanning Materials Committee of the Imperial Institute have been at work on the difficult question of finding markets within the Empire for the Indian raw hides and skins, which before the war were exported to foreign countries, the hides chiefly to Germany and Austria and the the skins to the United States. The Committee have presented several reports, which are under consideration by the Government of India and in due course full information as to the results of their deliberations will no doubt be made public. It is clear however from the lecture given recently before the Royal Society of Arts by a member of the Committee, Sir Henry Ledgard, that the Committee are convinced that a market for these hides can be found within the Empire, partly by increased tannage in India and partly by export to the United Kingdom and to the Dominions, especially Canada, Australia and South Africa, and it is known that the Committee have already taken action to familiarise tanners in Canada and South Africa with the good qualities of Indian hides. The first step towards effective post-war action in connection with hides and skins, as with other essential raw materials, is complete and accurate knowledge of the trade. The Imperial Institute provides this information in an article entitled "Indian Hides and Skins" published in current number of its *Bulletin* (No. 2 of 1918: John Murray, 2*s*. 6*d*.) just issued. The article deals exhaustively with Indian sources of supply of hides aud skins, estimates the present output in comparison with that of other competing countries and discusses in detail the trade figures in pre-war times and the changes in destination of exports brought about by the war. This information should be of great value to all concerned in this trade and the industries dependent on hides and skins as raw materials.

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In this issue Mr. W. P. Campbell of the Forest Products of Laboratories of Canada discusses the fuel value of wood. The fuel question is at present a topic of the hour in Mysore. Mr. Campbell's treatment of the subject leaves little to be desired. We shall be glad to see the subject of Mysore woods taken up in the manner in which Mr. Campbell has discussed the more common Canadian words. The subject is well worth careful study and we commend it to those interested in forestry.

GLEANINGS.

The Imperial Institute, in continuation of its publications with reference to the mineral resources of the Empire, has now issued a map with diagrams indicating the sources within the Empire of the chief metals of commercial importance. The out-line map shows the occurrence in each British country of important metallic ores, and also the existence of deposits at present unworked, The diagrams attached to the map give for 1915 the production of each country, as well as the total British output aud the world's output of each important metal or ore. Among the striking features disclosed are that in the case of gold more than half the total production is within the Empire, the principal producer being South Africa; with silver, the British proportion is rather less than one-fifth, the principal producer being Canada; in the cases of manganese, chromium, tin, and molybdenum, the British proportion is near one-half. It is remarkable that there appears to be scarcely any production of the valuable metals mercury and platinum within the Empire, so that we are almost entirely dependent on foreign countries for supplies.

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Replying to a question in the House of Commons on October 24th, Mr. Kellaway (Ministry of Munitions) said that a scheme for recovering potash on a commercial scale from the blast furnaces used in the manufacture pig-iron was approved last year. In consequence the Ministry had encouraged the installation at various ironworks of gas-cleaning plant designed to extract from the furnace gases potash-bearing dust. Certain of these plants were now in operation, others were under erection, while others, again, were in conrse of contruction. A factory had also been erected at which muriate of potash, free from deleterious impurities, was being manufactured from such dust. This factory was capable of dealing with all the dust that could be collectedby the gas-cleaning plants now under erection and construction. As other gas-cleaning plants were tnstalled, it was proposed to erect other factories in suitable localities. A small amount of potash was also being obtained as a by-product of the cement industry, and experiments were at the present time being carried on with a view largely to increase the amount so recovered.

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The *Railway Gazette* of September 13th says that the iron and steel mills of the United States are greatly in need of scrap iron, the demand for this material far exceeding the supply. The railways have always been one of the largest sources of supply for scrap iron and steel, and the prices now being paid for such materials are sufficiently high to warrant special efforts in the collection of scrap. Apart from this consideration, it is felt that the railways should do their best to make up the deficiency for patriotic reasons. It has been calculated that if the whole of the iron and steel scrap in the country were marketed there would be no shortage of steel, but this can only be accomplished by very great effort. The railways can not only be of great, help in collecting and marketing their own scrap but they can do much by urging others with whom they come in contact to do the same, and by helping to promote and encourage "Sell Your Scrap" campaigns in the different communities which they serve.

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The wonderful possibilities of Tasmania for the development of water-power are commented on in *Power.* The island possesses just in its centre, on a high elevation, a lake sufficiently. large to provide its industries with all the electrical power that may be needed for some time to come. The basis of the whole system is the Great Lake. With a catchment area of 216 square miles, and a water area of 50 square miles, it forms an ideal foundation for a great hydro-electric enterprise. A dam that has been constructed on the southern outlet of the lake provides for an even depth of 11 feet above sill level, and experience has proved that this will be sufficient to guarantee a regular flow of water. Experiments made during the first year of operation have shown that during a year of normal rainfall a total of 70,000 horse-power can easily be obtained from the lake.

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A loan on $1,000,000 has been made to the Forest Service from the President Wilson's special defence fund to combat fires in the national forests of North-western and Pacific Coast States.

ECONOMIC NOTES.

AGRICULTURE.

The Neglected Pomegranate.

We take the following article on Pomegranate cultivation from the Barbados *Agricultural News* and in doing so would add that though at one time Bangalore was famous for its pomegranate fruits, they are far too scarce now. Fruit growing has still to be developed in the *State* and in any scheme of fruit culture the pomegranate ought to occupy a large space. Our contemporary says :—

Of all fruits at present grown, merely as a fruit pleasant to the taste, the pomegranate is probably the one of which we have the earliest records in history. It is mentioned with honour in the earliest writings extant of the nations who are the parents of modern civilization. Homer mentions it in the Odyssey as grown in the gardens of Phœnicia, and the references to it in the Bible, from the Mosaic books onward, are frequent, as will be easily remembered.

The pomegranate is probably a native of the western parts of Persia. Thence it was dispersed eastward and westward to China on the east, and along the borders of the Mediterranean to the west, very early in historic times. Wherever it was introduced it was held in high esteem as a fruit. The conquerors of the Western Hemisphere, among other fruits, such as the orange and its relatives, did not fail to introduce the pomegranate, so long cultivated in Southern Spain. Since then the cultivation of the pomegranate has spread throug all the tropical and semi-tropical regions of the New World. And yet to-day it is one of the most neglected fruits in these parts of the world ; the reason being probably want of care in cultivation, and no attention to selection, which has caused a deterioration on the fruit.

In the United States, however, there has been of late more interest in this neglected fruit. There are still descendants of the old pomegranate trees planted by the first Spanish settlers in California. These are still of a fair quality, but distinctly of a mongrel seedling type. As a possible fruit for export to northern markets the pomegranate has been the subject of experiments at the College of Agriculture Experiments Station, Berkeley, California. Form *Bulletin No. 276*, January 1, 1917, the following particulars as to variety and culture are taken.

There are two general types of pomegranate grown in California at present, the white-flowered type and the pink or red-flowered type. The white flowered type is considered undesirable for cultivation as wanting in attractiveness, flavour, and keeping quality. As to the red-flowered type, the different varieties vary in every direction, but among them there seem to have been evolved varieties of great merit. There are only five which at present are found to be of value in the fruit market. Of these the one which is most in favour in California, and which has taken a place in northern markets, is the one which is designated Wonderful. Apparently this is a sport from Florida cuttings brought to California in 1896.

As was said above, the pomegranate is a very neglected fruit in these islands, because, like the Californian variety before selection was brought to bear on it, the pomegranate in the West Indies is only a mongrel seedling. The importation of fine varieties, the selection of promising native varieties, and a little attention paid to its cultivation might bring to public favour in these islands this most ancient fruit.

The climate suits the pomegranate for although it is grown in the East in almost desert regions, being well adapted to withstand drought, yet it will grow and fruit well under conditions of heavy rainfall, thus making it adaptable to dry islands such as Antigua, or to wet ones such as Dominica. The pomegranate, therefore, in its improved varieties may be well worth experimenting with by our West Indian horticulturists.

The propagation of the pomegranate in the West Indies, as far as is known by the writer of this article, is only by seedlings. These can never be depended upon to reproduce exactly the characteristics of the parent plant ; hence the failure to keep up a good type of plant. It may, however, be easily grown from cuttings. Hardwood cuttings 10 to 12 inches long, and from ¼ to ½ inch in diameter, cut from the shoots or suckers of a pomegranate tree, will grow readily when planted in the open ground. In this way a desirable variety can be maintained and multiplied. In this way also the pomegranate may be employed to form a most efficient and ornamental hedge. Cuttings set out in a double row, say, 8 feet by 4 feet, and pruned strongly in early stages of growth, will soon form by growth of suckers an impenetrable hedge, and one which in the blossoming season is a thing of beauty.

The pomegranate is no more exacting in its soil requirements than it is in the moisture that it needs. It does best, however, on deep soils, of a fairly heavy nature.

It is not probable that any trade to northern markets in pomegranates will soon be accessible to West Indian growers, although the tough rind of the pomegranate endues it with remarkable keeping powers ; yet as a most refreshing and piquant fruits, when of good variety and in good condition, it is to be recommended to more attention on the part of our local horticulturists for local markets.

THE UTILIZATION OF SISAL WASTE.

We have more than once, says *Tropical Life*, urged the advantages that would accrue to planters of sisal, maguey, manila or other fibres on a large scale, if experiments were made with the view of ascertaining whether the fibre waste could not be utilized for paper making, and if the liquor expressed from the leaves or stems was not a suitable raw material to make alcohol for motor fuel, etc. In our issues of April and May, 1912, we fully discussed the extraction of alcohol from sisal refuse. Now we hear that in British East Africa experiments have been carried out for a year or two to try and ascertain what could be done with sisal waste.

The results, however, confirmed those previously obtained. A preliminary analysis of the juice of leaves from the coast gave just about the same value for the sugar content as was obtained for the Highland material, namely, not more than 3 per cent.

In Yucatan, where sisal waste has been fermented with success and alcohol from such has been put on the market (according to report), the sugar content never went below 9·4 per cent and at the end of their dry season is stated to have reached as much as 14·1 per cent. Most of the alcohol was produced from leaves containing on the average 12 per cent sugar.

As stated in last year's report, a yeast was isolated from sisal plants which fermented a glucose solution, but which was quickly killed in the sisal extract. This was no doubt due to the action of organic acids in the extract which were present in great quantities.

On neutralization with sodium carbonate and the addition of a small quantity of glucose, it was found possible for the yeast to live in the sisal extract, but no fermentation was induced.

Further work on more exhaustive analysis and on the neutralization and destruction of the organic acids was not completed owing to the analyst, for want of time, being unable to carry out experiments of this nature.

The work of discovering and isolating further yeast ceased owing to the absence of the official on more pressing work.

It would be of great interest to continue the work, for the analyst was by no means certain that the 3 per cent represented the whole of the sugars contained in the sisal juice. Moreover, the organic acids present might prove of importance (oxalic acid, for example, is found to be present in any quantity); but the whole problem is one of careful research.

We hope these experiments, therefore, will be continued not only in East Africa, but elsewhere as well, as there never was so urgent a demand for raw material for paper making and for commercial alcohol as at present.

COCO-NUT POONAC AS A MANURE.

Mr. Kelway Bamber, Agricultural Chemist to the Government of Ceylon, has published the following particulars showing the value of coco-nut poonac as manure (see Leaflet No. 1 of the *Department of Agriculture, Ceylon*, price 5 cents).

Owing to the difficulty of freight and consequent lower demand the price of coco-nut poonac has fallen considerably, and the question arises as to its manurial value, and whether it could be profitably used as a manure instead of a food.

The following is a manurial analysis of an ordinary coco-nut poonac:—

	Per cent.
Nitrogen	3·33
Phosphoric acid	1·47
Potash	1·29
Lime	0·90
Soda (as salt)	1·17

It is rather poorer in nitrogen than rape cake, which contains 4 per cent of that constituent, and which costs at present Rs. 95 per ton, equivalent to Rs. 1·06 per lb. of nitrogen.

The other cakes used for manurial purposes and now on the market are castor cake in two qualities and ground-nut cake. Their nitrogen content, cost per ton and cost per lb. of nitrogen, are as follows:—

	Guaranteed percentage	Cost per ton R.	Cost per lb. nitrogen Rs.	c.
Castor cake No. 1 ...	5% nitrogen	100 ...	0	89
,, No. 2 ...	4½% ,, ...	95 ...	0	94
Ground-nut cake ...	7% ,, ...	110 ...	0	70

Allowing a value to the nitrogen equal to that in ground-nut cake, the value of coco-nut poonac per ton would be Rs. 52·20 in Colombo.

Ground-nut cake contains a somewhat similar proportion of phosphoric acid and potash, so that in this respect the manurial value is the same.

The equivalent amounts of coco-nut poonac required to give the same amount of nitrogen as 100 lb. of the various other cakes are :—

	lb.		lb.
Ground-nut cake	100 =	Coco-nut poonac	210
Castor cake No. 1	100 =	,, ,,	150
,, No. 2	100 =	,, ,,	135
Rape cake ...	100 =	,, ,,	120

Although under ordinary circumstances the value of coco-nut poonac as a food for cattle and horses is too high for it to be used directly as a manure, present conditions render its use advisable, especially as it is liable to become rancid on keeping, unless very thoroughly dried.

USES OF STRAW.

The Highland and Agricultural Society have issued a memorandum on the utilisation of straw, by Dr. J. F. Tocher, Aberdeen, the consulting chemist to the Society.

Dr. Tocher states that the total area under crops and grass in Scotland for the year 1915 amounted to 4,781,000 acres, of which 3,290,000 was arable land, leaving 1,491,000 acres under permanent grass The total area under oats was 982,600 acres ; under barley, 149,000 acres ; and under wheat 77,000 acres. We should thus expect on an average at least about 1,200,000 tons of straw from oats, etc., annually. It appears that the Board of Agriculture for Scotland desires that about 350,000 additional acres should be brought into cultivation during 1918. If this area was entirely grain-producing it would mean that over 420,000 additional tons of straw would be available at the fall of 1918 and have to be utilised in some way or other.

It has been suggested that, if straw were rendered more digestible, a greater quantity of it woud be used for feeding purposes. Under a process patented a few years ago, straw was treated with a weak solution of caustic soda and heatead under pressure for about sixty hours. The effect of the soda under these conditions was to dissolve the encrusting material of the straw, and a great deal of the soda was itself used up by the acid formed during steam pressure. The organic matter of oat straw treated in this way showed a digestibility co-efficient of 60 per cent as against 40 per cent for the original straw. Digestion of straw by soda in large boilers under pressure could be undertaken by farmers themselves, or, as a side line, either by manufacturers of feeding stuffs or by others who would be willing to use the capital necessary for such a purpose.

Paper and Straw Board.

Paper manufacturers see no reason why straw should not be much more largely used in the manufacture of various grades of paper, provided constant supplies can be obtained, and provided also that farmers would take the trouble to keep straw reasonably free from the stalks of docks, thistles, and similar plants. These weeds are the cause of great trouble in preparing straw pulp, and their presence in straw raises the cost of production. Straw pulp may be looked upon as a substitute for esparto, although it does not seem probable that straw can ever entirely supersede esparto, the ideal fibre in paper-making. The best quality of straw pulp could be freely used in the hardening of ordinary writing paper, which is largely composed of wood and esparto pulps, but which could be made entirely from wood and straw pulps. Experiments were recently carried out in two Scottish miles for the purpose of determining the yield and of testing the utility of pulp obtained from straw. Both wheat straw and oat straw were tested, and fairly satisfactory results were obtained. In one of the tests docks and thistles gave trouble. In the other test, strainings after bleaching were found to consist of binder twine, which is waste material not usable by paper manfacturers, but which could be utilised in making straw-boards or for other purposes. A yield of pulp was obtained from oat straw equal to 35 per cent of the weight of bonedry straw. Oat straw is not quite so knotty as wheat straw, and therefore is less difficult to handle from the point of view of the paper manufacturer. The adoption of straw instead of esparto as a sources of pulp in paper-making would materially aid in the utilisation of straw, but it is unlikely that the whole surplus of a season could be used up by papermakers.

The utilisation of straw for straw-boards could be effected by paper manufacturers. Special machinery would be necessary, and, naturally, before manufacturers would sink their capital, they would require some assurance that the supply of straw would not only be sufficient, but also that the manufactured article would be bought and sold under conditions which would be effective against the dumping which existed up to the outbreak of war. The cheapest straw-boards are made from straw and waste material, and it seems manufacturers in this country have been unable to compete with continental manufacturers, who before the war sold it at about £7 per ton. The present price for such straw-board would be about

£11. It should be possible for manufacturers in this country to adapt themselves to the new circumstances and to turn out suitable straw-boards such as are found on the covers of all ordinary books. The proportion of straw used in the manufacture of straw-boards would be very much greater than that used in the manufacture of paper on account of the variety of uses of straw-board. While, therefore, a certain amount of straw for paper making would be utilised, straw-board manufacture is the practical outlet for the expected surplus, and should receive the immediate attention of the authorities. The problem is an economic problem, and therefore, comes within the purview of the recommendations of the Economic Conference. Paper manufacturers and others directly interested in the manufacture of paper and straw-board should have no hesitation in preparing a case to present to the Government asking for assistance in founding a straw-board industry, and for guidance and aid in the manufacture of straw pulp, and generally in the proper utilisation of home straw, in order to prevent waste and to increase home production.

PRODUCTION OF NITROGEN.

It seems desirable to mention in connection with the utilisation of straw its possible value as an agent in increasing a growth of azotobacter and other nitrogen-fixing organisms naturally present in the soil. The mineral and vegetable constituents of straw have been found to promote a rapid growth of azotobacter. Experiments with straw alone and with straw containing about one part of arsenic in 100,000 parts have been found to give interesting and valuable results, and, in particular, confirm previous results as to the value of arsenic as a stimulant. There was a distinct increase in the amount of nitrogen due to the rapid multiplication of these organisms. The further suggestion is, therefore, made that straw which cannot be used for ordinary feeding purposes, and any surplus straw left over after the wants of agriculturists, papermakers, and straw board makers have been fully supplied should be used (1) in the making of a more digestible straw by means of soda solution, and (2) in the treatment of straw as an agent to promote the growth of nitrogen-fixing organisms for the purpose of transferring from the atmosphere to the soil an appreciable proportion of the valuable fertiliser constituent, nitrogen, in a form available for plant growth. If straw proved a suitable agent for accumulating nitrogen economically, then, if properly treated and properly stored, its value would increase, and not decrease in keeping. This would be directly an advantage to agriculture, and would thereby be indirectly an advantage to the State in the further production of food.

SERICULTURE IN BENGAL.

We take the following from the Report of Bengal Agricultural Department for 1917-18:—

The operations for the improvement of the silk industry in Bengal were continued on the lines of the previous under the general control of a committee consisting of the Director of Agriculture, the Collectors of Murshidabad and Mulda, and three non-officials. No action has been taken on the Report of Mr. Lefroy, late Imperial Silk Expert. So far as the Report concerns the Bengal Industry, it recommends little more than the adoption of the recommendations of the Oldham Committee of the year 1906. It is generally held, that if the *Pebrine* disease of the silk-worm can be sucessfully combated the silk industry (at least so far as it concerns the production of silk cocoons) would still be economically sound. It is further agreed that with *Polyvoltine* races the produce of disease free worms will even in the event of their contracting pebrine during their "Education" succeed in spinning cocoons. As there appears to be little hope of the silk-worm rearers in Bengal producing disease free seed for themselves the problem becomes one of producing a sufficient quantity of such seed for the industry. The Department at present only supplies only a small portion of the total requirements of seed for the Mulberry Districts in Bengal and the problem would then at the first sight seem to consist simply in the multiplication of our present efforts. Not every type of organization, however, is capable of expansion owing to the difficulties of supervision, and supervision in the present case is all important. It is clear, therefore, that the expansion of the Sericultural Department cannot be along present line. In fact, an entirely new type of organization will have to be evolved before any considerable expansion is possible.

Babu A. C. Ghosh held the post of the Superintendent of Sericulture throughout the period under Report. He spent 244 days on tour, and constantly inspected the various nurseries. High prices have been obtained for the nursery seed cocoons which have sold at a premium over local produce. The total receipts from the nurseries for the nine months from 1st July 1917 to 31st March 1918 amounted to Rs. 32,662 against Rs. 28,737 of the preceding 12 months due to Revenue returns on an increased expenditure on manures, etc., and higher prices for "seed". The total expenditure was Rs. 61,093.

Ten boys passed from the Rajshahi Sericultural School and two from the Sericultural Class at Berhampore. It is reported that most of the passed students have constructed model rearing houses and have been successful in rearing.

Cross Breeding Experiments:—The hybridizing experiments initiated by M. Grangeon at Berhampore before he left for Military duty in France in 1914 remained in charge of Mr. P. C. Chaudri, Superintendent of the Berhampore Central Nursery. The Berhampore nursery has been temporarily set aside for testing cross bred races on a large scale. Some of these are apparently much superior to local *Mistari* races, but experience of their hardiness and immunity to disease is necessary before distributing any of them to silk-worm rearers in the districts.

DAIRYING.

A correspondent writes to *Farm and Home* :—

SALTING OF BUTTER.

Some people prefer a very mild, creamy butter, while others like a pronounced salty taste. Generally, however, a medium salting of, say, half an ounce to the pound will be best for ordinary retail trade. Whether in large or small quantities, there is not the slightest doubt that salt has a considerable value in butter making. It certainly helps to improve or bring out a good flavour, and it also serves to disguise, to a certain extent, a somewhat "off" flavour although here, of course, there is no fear of its being abused to cover faults due directly to improper ripening of cream or lack of cleanliness in the dairy. But salt is principally used on account of its preservative properties. It is impossible to keep butter sweet for any length of time unless a certain proportion of salt is worked into it during the process of manufacture. That is why one uses such a large quantity of it in the potting of butter for storage. Probably too little attention is paid to the use of salt in farm butter-making dairies, and the result of this is that the maker is more or less careless as to the quality of the article he or she is using. There are at present only a few good brands of pure dairy salt on the market, and it is most essential to use one of these if the best results are to be secured. Salt, in the true sense of the word, and, as far as butter-making is concerned, should consist of nothing more than sodium chloride. But many so-called dairy salts contain a great many things besides this compound. When it is remembered that anything in salt besides sodium chloride is bitter and so tends to impart a bitter flavour to butter the necessity for using absolutely pure salt will at once be apparent. Ordinary salt is no use at all for this purpose and it must be specially prepared for butter-making; and in the course of this preparation all impurities and foreign substances must be entirely eliminated. The latter are present in rather a large quantity in ordinary household salt, which explains why that commodity is so coarse and cakes so quickly. Specially prepared salt never cakes in the most humid of atmospheres, for it contains nothing that will absorb and retain the moisture. In some cases very injurious, and even poisonous, substances have been detected in salt crudely obtained by merely evaporating brine. Barium chloride, a virulent poison, has been found in small quantities and many other substances that are known to have a bad effect on its flavour and keeping qualities of butter.

A GOOD DAIRY SALT.

A good dairy salt should consist of at least 28 per cent of sodium chloride; it should be readily soluble in water, and ought to retain its dryness indefinitely under suitable conditions. Gypsum, or anything of foreign nature, does harm to the butter, and entails a great waste, so that in the end it is really more economical to purchase a pure dairy salt at, say, 3s. 6d. per cwt., than a cheap but vastly inferior product which very likely contains a large proportion of calcium chloride—a compound that has the distinction of being a very powerful absorbent of moisture. As a rule, dry salting is practised in farm dairies, although, as a matter of fact, the best method of salting butter is by means of bringing. The later is, however, the more expensive process, and so it is confined to small dairies, and where exhibition butter or produce of a very high standard of quality is being produced.

For diary salting the actual quantity of salt used may vary from quarter to half an ounce to every pound of butter according to the degree of salting required. Care must always be taken not to use too much salt, for an excessive quantity usually destroys the volatile fats in the produce, and so spoils the characteristic flavour and aroma associated with first-class produce. Needless to say, whatever quantity of salt is used, a certain amount of waste is incured, as a proportion of it is carried away in the butter-milk which escapes from the grains when the butter is worked. But the presence of salt itself has some good effect, even as far as the actual waste is concerned, for it helps to liberate the butter milk in that process. To calculate the amount of salt required, the grains should be scooped out of the churn into a muslin cloth and weighed. The correct proportion can then be easily estimated, and when the quantity of salt has been weighed out it should be sprinkled evenly over the grains on the worker, and left to soak in for about ten minutes to a quarter of an hour. In the meantime the butter should be covered with a fine muslin cloth. Next, the grains should be given a good working, so as to get rid of the butter milk, and afterwards the butter snould be allowed to stand for about twenty minutes, then worked again, and finally made up. Work by means of downward pressure alone, and never with a sliding motion, for this will inevitably spoil the fine granular texture of the butter, and prevent the salt from being evenly distributed throughout the mass. Practically double the quantity of salt is required in bringing as in dry salting, but a certain amount of economy can be effected by washing the butter thoroughly before adding the brine, and using the same brine again for another churning on the same day. To make a suitable brain, dissolve 1 to 2 lb. of salt in a gallon of water, according to requirements, and strain it into a churn through a piece of fine butter-muslin. Such methods of salting will usually distribute the salt much more evenly in the butter than dry salting.

INDUSTRIES.

The Utilisation of Rice Straw and Rice Husks.

The following account of the uses to which rice straw and rice husks can be put is given in the *Bulletin of the Imperial Institute* :—

RICE STRAW FOR PAPER-MAKING.

A sample of rice straw was forwarded from Egypt in April 1917, in order to ascertain its suitability as a paper-making material.

The sample consisted of clean rice straw of brownish-yellow tint. It was examined with the following results :—

		Per cent.	
Moisture...	...	11·8	
Ash ...	...	17·6	Expressed on
Cellulose...	...	50·0	the dry straw.

Length of ultimate fibres, 0·6 to 3·0 mm. ; mostly 0·9 to 1·3 mm.

The straw was submitted to treatment with varying quantities of caustic soda under conditions similar to those usually employed for the manufacture of paper pulp, with the results given in the following table :—

Experiment	Caustic soda used		Conditions of boiling		Yield of dry pulp expressed on the straw as received
	Parts per 100 parts of straw	Parts per 100 parts of solution	Time	Temperature	
			Hour		Per cent.
A	14	4·0	4	140°C.	44
B	10	2·5	4	140°C.	50
C	8	2·0	4	140°C.	52
E	6	1·5	4	140°C.	53

The pulp obtained in these experiments was in all cases of pale colour and yielded a strong opaque paper of excellent quality which did not shrink greatly on drying. Except in the case of experiment E the pulp bleached easily to a very pale cream colour, almost a pure white.

A further experiment was made in order to ascertain whether the straw could be converted into a satisfactory pulp by boiling with milk of lime under the following conditions :—

Experiment	Lime(CaO) used. Parts per 100 parts of straw	Conditions of boiling.		Yield of dry pulp expressed on the straw as received
		Time	Temperature	
		Hours		Per cent.
F	20	12	140°C.	56

The pulp produced by this method was bright yellow-brown and did not beat easily. It yielded an opaque paper of fair strength, but it could not be bleached satisfactorily. This pulp should, however, be quite suitable for the manufacture of brown paper and straw board.

It will be seen that this rice straw gives a good yield of pulp, and only requires mild treatment, *i.e.*, the use of comparatively small amounts of caustic soda to produce a pulp which will bleach easily to a pale cream colour. The advantage which rice straw possesses of only requiring small amounts of caustic soda to convert it into pulp will, however, be counteracted to some extent by losses in the materials containing a large proportion of silica.

The results obtained at the Imperial Institute with this Egyptian rice straw confirm those already recorded in the United States, and show that the straw when treated by the soda process yields pulp of good quality which is suitable for the manufacture of white paper. The straw will also serve for the production of straw board and brown paper if treated by either the soda or lime processes.

It is improbable that rice straw could be remuneratively exported from the producing country as a paper-making material in normal conditions, but if adequate supplies are available, its conversion into "half-stuff" for export would be worth consideration. It is also possible that the rice straw might be used locally for the manufacture of paper or straw board, either to supply the requirements of the local market or for export.

RICE HUSKS.

The profitable utilisation of the enormous quantity of rice husks produced in the milling of rice has long been under consideration. It has been suggested that they might be used for paper-making, and as no experiments on this subject appear to be on record, the matter was recently investigated at the Imperial Institute.

The sample of rice husks examined contained 7·9 per cent of moisture and the dry husks yielded 14·7 per cent of ash and 42 per cent of cellulose. The

ultimate fibres varied in length from 0·5 to 1·5 mm. being mostly from 0·5 to 0·7 mm.

The husks were treated with caustic soda under conditions similar to those employed at a paper-mill with the following results :—

Caustic soda used		Conditions of boiling.		Yield of dry pulp expressed on husks as received
Parts per 100 parts of husks	Parts per 100 parts of solution	Time	Temperature	
		Hour		Per cent
16	4	4½	140°C.	36

The pulp contained a large proportion of gelatinous material which could not be satisfactorily removed by beating and washing. It furnished paper of a medium brown colour which was very weak and brittle and cracked when folded. The pulp could not be satisfactorily bleached.

The results of this experiment indicate that rice husks are unsuitable for the manufacture of paper. The pulp might be used as a filler in admixture with longer fibred pulps for the manufacture of low-grade paper or straw board, but it is somewhat unlikely that its preparation for such purposes would be remunerative.

MANUFACTURE OF MATCHES IN RANGOON.

Mr. A. J. Butterwick, P.F.S., contributes the following article to the October number of the *Indian Forester* :—

At the end of 1911 and the beginning of 1912, the writer was placed on special duty to mark timber for the match factory of Messrs. Lim Soo Hean & Co., Rangoon, in the Mahuya and Paunglin Reserves, Hlegu Range, which, at that time, was a portion of the Pegu Forest Division. The match industry in Rangoon was then in its infancy, and it was not known for certain at that time what timbers were suitable for it or not. According to orders received, the writer marked the following species for the match firm :—

1. Letpan *(Bombax malbaricum).*
2. Didu *(Bombax insigne).*
3. Thitpok *(Tetrameles nudiflora).*
4. Setkadone *(Trewia nudiflora).*
5. Tein *(Stephegyne parvifolia).*
6. Taung thin baw (probably a species of *Sterculia).*
7. Ma-u *(Anthocephalus Cadamba).*
8. Odein *(Ehretia lævis).*
9. Shawbyu *(Sterculia fœtida).*
10. Hmondaing *(Kokoona littoralis).*
11. Taungmeok *(Alstonia scholaris).*
12. Budalet *(Elæocarpus locunosus).*
13. Gwe *(Spondias mangifera).*
14. Thayet *(Mangifera indica).*

The above particular kinds were very probably selected as an experimental measure, as their timber was lightish in colour, and the logs floated easily even when green. The habitat of almost all of them was the damp evergreen forests, which are so commonly found covering the alluvial land along streams, and which are annually inundated during the rains. One of the predominating species of forests is a kind of cane called danon or zanon *(Calamus arborescens).* The logs obtained from the above-mentioned trees were floated down to Rangoon by way of the Mahuya and Paunglin Chaungs, which in conjunction formed the well-known Pazundaung Creek.

At that time, the writer was very keen to visit the match factory in Rangoon and see which timber was found suitable for the industry and which unsuitable, As he was shortly after transferred from the Pegu Division to the Forest School, Pyinmana, opportunity did not offer for some time. In December 1917, however, when on tour with the students of the Forest School, a visit to the Rangoon match factory was one of the items of the itinerary. The proprietors, Messrs. Lim Soo Hean & Co., not only allowed the School to see their match factory at work, but also very kindly deputed one of their representatives to explain to the students all the different stages in the manufacture. From that visit and also from a subsequent letter from the firm, the following notes have been compiled. The writer is much indebted, therefore, to Messrs. Lim Soo Hean & Co., Rangoon, for all the help given, and ventures to publish herewith the information obtained from them in the hope that it may be of some interest to the readers of the *Indian Forester.*

The factory is situated on the right bank of the Rangoon river, 6 miles below the capital, near a village called Kanaung. As far as it was gathered, the site was chosen for no other reason but that Messrs. Lim Soo Hean & Co. had a rice factory there originally, and it was thought that the machinery of both could be worked by one superior Engineering staff. Besides this, the site was very convenient for a match factory being close to Rangoon and right on the banks of the river. The

factory was opened in 1909. The only timbers which are at present in use in it are Letpan (*Bombax malabaricum*) and Shawbyu (*Sterculia fœtida*). The former is used for the box-covers and for the sides of the drawers, the latter for the splints and for the bottoms of the drawers. Messrs. Lim Soo Hean & Co., have found all other woods a failure for one reason or other. Even the Shan States pine (*Pinus Khasya*) has been tried, but it too was found to be unsuitable as the knots in the wood chipped the sharp keen edges of the peeling knives in their machines, and the exuding resin clogged their machinery. The Letpan and Shawbyu logs are at present obtained chiefly from the Shwegyin Division on the Sittang river: Government duty costs the firm Rs. 2 a ton and carriage from Shwegyin to Rangoon *via* the Pegu-Sittang Canal Rs. 13 a ton.

The following essentials are required in the Letpan and Shawbyu logs. They must be green and as cylindrical as possible. Also the timber must not be spongy and brittle like cork, as this causes the veneers to break off during the peeling. Logs ranging in girth from 4′ 6″ to 9′ (without bark) are most in demand. Each log is dragged up a slipway from a small inlet from the river. The bark is then removed by hammering and hand-peeling. This bark is useless for cordage, as salt water has thoroughly soaked into it and ruined its usefulness. After the bark has been torn off, the logs are cut up into lengths of 2′ 2″ by a straight cross-cut saw worked by a small machine. Each 2′ 2″ piece is then placed on to the veneering or peeling machine.

The log is revolved round at a great speed towards the table, which is about 12′ long, and, at the same time, the knife keeps eating into it, advancing very gradually according to requirements. Thin sheets of wood varying in thickness from $\frac{1}{100}$″ to $\frac{1}{16}$″ are, therefore, rolled on to the table and helped on by men standing along the sides. At the commencement, the first 2 or 3 sheets are broken and non-continuous, as the logs are very seldom cylindrical. These are rejected until continuous sheets of wood are obtained. In a very short time the log is whittled down to a cylinder about 4″ in diameter. This is rejected as the wood near the pith is considered too spongy and brittle for veneers. There are altogether five such veneering machines, one for the splints, one for the bottoms of the drawers, one for the sides of the drawers and two for the box-covers. The first two kinds use Shawbyu timber and the next three Letpan. The machine, which peels the logs for the splints, divides at the same the wooden sheets into halves; each half, therefore being about 1′ 1″ broad. The machine for the bottom of the drawers at the time of peeling also divides the sheet into 11 portions, each being 2¼″ broad. There is, accordingly, a small wastage of about an inch here. The machine for the sides of the drawers at the time of peeling, not only severs the sheets into three portions, each being about 8½″ broad, but also scratches on each portion lines to mark off the places where the folding will afterwards be done when the drawers are finally made. Similarly the machines for the box-covers at the time of peeling not only sever the sheets into five strips, each of 5″ width, but also scratch on each strip the places for the subsequent folding.

From the peeling or veneering machines, the strips are then taken to the cutting or slicing machines. Here they are placed tightly packed one over another into a chamber about 7″ to 10″ high. Each of these machines has a kind of sharp guillotine knife fixed in a frame, which works up and down rapidly. As it goes sliding up and down, the compressed bundle of veneer strips is forced out to the required distance and is neatly sliced off. For the splints this distance is minute and is just enough to get them cut square; for the bottoms of the drawers it is 1″, for the sides of drawers ⅝″, and for the box-covers 2¼″. In the case of splints, the cutting machine has also attached to the inner side of the guillotine knife, and placed at right angles to it, five minute knives situated at equal distances apart from one another. At the same time, therefore, as the former slices through the compressed bundle of veeneer sheets, the latter neatly sever the cut portions into six rows of splints about 2″ long. It is believed that this machine needs the most careful attention, for it is not adjusted properly, the splints will not be cut square. To give an idea of how fast these machines work, if we take the sheet for the splints as $\frac{1}{12}$ of an inch thick, and the space in the chamber into which the sheets are compressed at 7″, it will be seen that about 84 sheets are worked on at a time by the slicing machine. The little knives mentioned above divide these into six portions for the splints. Therefore, each time the guillotine works $84 \times 6 = 504$ splints are cut. The time taken by the knife to go up and down was not more than 4 seconds. So that in one minute one machine cuts about $504 \times 15 =$ 7,560 splints.

These splints are then gathered up in baskets and taken to the drying rooms. Here they are placed in huge cylindrical drums (7′ long × 3′ 8″ diameter) with perforated walls. These are then railed into chambers heated by steam pipes, and during the heating, they are slowly revolved round and round. This is done for five hours, and it is said that by the end of that time the splints are thoroughly dried, cleaned and polished. From this

drying chamber they are then taken and placed into a sorting machine, which, by a shaking movement through a gauged sieve, rejects the broken bits. The splints are then neatly arranged in iron trays 2″ × 14″ × 2″ and taken to the machines which provide them with their head composition.

There are five such continuous machines, and the ingenuity of their mechanism is absolutely bewildering and wonderful. The splints are gathered directly from the iron trays into a receptacle in the middle of the front of each of the machines. By a shaking movement, the splints are passed breadthwise from the said receptacle into the grooves of a sort of grill below it. The front ends of the splints lying in the groove project a little over the edge of the table, and whilst a pressure rail at the rear comes into play pressing against their other ends, the grill makes a forward movement and fees the splints into the holes of a large metal conveyor-platform, which keeps slowly moving. The end of each splint is thus firmly fixed in a hole in this platform, and as these holes are spaced apart a short distance from one another, the splints cannot touch each other. At first the splints stick out under the conveyor-platform, and in this position are transferred slowly by the moving platform over a heating arrangement to the paraffining apparatus, and then through the chocolate-coloured dipping solution. At the last named, each splint is furnished with its little spherical head, which is made of some igniting mixture, the chief ingredient of which is chlorate of potash. After this, the conveyor-platform passes round a drum, 42″ in diameter situated at the rear of the machine. The treated splints are thus brought automatically on the upper side of the platform, which now looks like a gargantuan pincushion. In this position they are acted upon very efficaciously by a propellor fan, which, revolving over them at an enormous speed, helps to dry them. Continuing thus, the splints on the conveyor-platform arrive at the part of the machine and pass through a channel through which a second fan blows a blast of air, so that a complete drying of their heads is effected. The conveyor-platform then turns downwards once more near the front of the machine, and carries the finished and dried matches in front of the discharging apparatus, which pushes them out into a leather receptacle, from which they are carried to the machine which fills them into the boxes.

In the meantime in another apartment, the drawers and the box-covers are being made. For the construction of the former, the bottom and side pieces obtained direct from the slicing machines mentioned above are used, each kind being packed one over another in these drawer-making machines. The bottom pieces are put on a moving horizontal platform and the side ones on a vertical decending one inside a tube. Inside a brass funnel near by the later is the paste, and on the left of the machine, wrapped up in a roll like a cinema film, is the blue paper cut to the required width. As the machines work, with clock work precision, the drawers are shot out from below beautifully and completely made. The newer kind of machines can make 50 drawers in a minute. In a similar machine the box-covers are made, 50 to the minute. All the above machines are worked by young Burmese girls, who have become thoroughly *au fait* in their manipulation. To see these drawers and box-covers being ejected so well and completely made, reminds one forcibly of the legendary machine where the pigs go in at one end and ready-made sausages and pig skin boots come out at the other.

The constructed drawers and boxes are then put on a large moving platform, which carries them to a chamber where they are dried for half an hour, and then conveyed to the filling machines. In each of these machines the box-covers are put in one tube, the finished splints in another and the drawers on a moving horizontal platform. The machines do the rest, and not only fill the requisite number of splints into each drawer, and push the filled drawer into a cover, but also by means of a pair of revolving circular brushes smear the two sides of the filled box with the dark-coloured substance for striking the matches on, the chief constituent of which is, it is believed, phosphorus. These field boxes are then dried for a short time in steam-heated chamber, after which they are carried to the machines which fasten the different kinds of labels on them. After this they are again dried for a short time, and are then taken to the last machines of all, which, not only make the familiar paper packets of ten books each, but also stick, on lables to each packet. It is believed that the output of each of these packing machines is 50 packets to the minute. The finished packets are then steam-dried as before and then packed for exportation. 120 packets are put into each tin case and six tin cases are put in each wooden box.

It will thus be seen that the whole of the manufacture of matches in Messrs. Lim Soo Hean and Company's factory is done by machinery. This machinery, it was noticed, was supplied by A. Roller and Company of Berlin, and to give the devil his due, to the inexperienced eye of the writer, it seemed to be extremely efficient and ingenious. It appears that a German engineer erected and managed at the beginning the machinery, and a German chemist worked out the formulæ for the different igniting and striking compositions for Messrs. Lim Soo Hean and Company. But since the advent of the war, or

possibly even before that time, the whole factory has been efficiently managed by a Burmese gentleman. The entire business speaks very well for the enterprise and business acumen of Messrs. Lim Soo Hean and Company. It is up to the general public, therefore, to give not only this firm, but also the *other match-manufacturing firm* in Mandalay, every encouragement by using their matches in preference to imported ones. If memory serves the writer right, the Viceroy, Lord Chelmsford, on his departure from Burma, took with him several cases of these locally made matches, and our late Lieutenant-Governor, Sir Harcourt Butler, ordered that these matches only should be used in Government House. It is also up to the Forest Department to give these firms *all the help and advice they need.* Both Letpan and Shawbyu flourish in places where no very valuable species can be grown. Also, both these species are soft wooded and quick growing. It will, therefore, be a moot question when funds and personnel permit, whether it will not be feasible to have plantations made of these two species and work them on short rotations.

PAPER TEXTILES IN CENTRAL EUROPE.

One of the most interesting of "ersatz" or substitute industries which have been developed in Central Europe, says the *Board of Trade Journal*, is that of so-called paper textiles. We have from time to time given details of the process by which paper fabrics are being made, and of the uses to which the products are being more or less successfully put. But the industry has not yet been surveyed as a whole in these columns, and an estimate made of its present size and possible future importance. The growth of this substitute industry has been very remarkable. Before the war it was experimental and comparatively trivial, curious rather than valuable. Under pressure of war's necessities, and of the shortage of cotton, jute and wool, it has expanded until many of the needs of the armies, and civil population of the Central Powers are supplied by means of it. It affords employment to numerous factories which without it must have been shut down, and it is to no smaller extent taking the place of the spinning and weaving industries which before the war were occupied upon real textile fabrics.

Growth of the Industry.

Long before the war both Germany and Austria had invented methods of manufacturing yarn from paper and wood pulp (cellulose), but no great headway was made. Among these yarns the best known were "Textilose," a composition of paper and cotton waste, and "textilit," made of paper and flax or jute waste. But when the British blockade put restrictions on the import of fibrous materials, and such textiles as were available were requisitioned for Army purposes, inventors turned their attention to the manufacture of pure paper yarns, and produced them to a rapidly increasing extent. It appears that during the first 18 months of the war not much progress was made; no doubt manufacturers took some time before they realised the difficulties which they would be obliged to face. But once a start had been effected, the progress was remarkably rapid, and by the end of 1917 we learn that, whereas before the war there had been but two factories in Germany engaged in the production of paper yarn, there were then as many as 250. In Austria there are now said to be 300. It is somewhat difficult to make any precise estimate of the amount of paper yarn produced in the two countries, but there are reasons for believing that it must be somewhere between 200,000 and 300,000 tons per annum.

Supplies of Paper Pulp.

Such an out-turn could not be produced without seriously affecting the supplies of paper needed for other purposes, and the new industry must have contributed materially to the shortage of paper that was already sufficiently acute before this new demand sprang up. Not only so, but at the time when by the action of our blockade supplies of cotton were cut off, wood pulp was needed in large quantities to replace it in the manufacture of explosives, and the supplies of material for making printing papers were thus further reduced. To meet these increased demands, the resources of the Central Empires were much strained. As was to be expected, they greatly increased their imports of pulp from Sweden, and made strenuous efforts to obtain more paper for spinning, but difficulties in the way of financing their purchases limited the extent of the opportunities in this direction. They also turned their attention to increasing their production of pulp from their home-grown timber, which was by no means inconsiderable before the war, and have endeavoured for this purpose to exploit also the forests in the districts occupied by their invading armies.

VALUE AS A SUBSTITUTE.

The question of greatest interest is, how far this substitute industry is likely to fulfil the hopes entertained for it, whether it will continue its activities in the period of reconstruction, and whether it will be established as a permanency after the war is over. What we need is exact knowledge of the possibilities and limitations of the substitute industries that have been evolved by the war. Much will depend economically on the extent to which the Central Empires can render themselves independent of the textiles which the Allied Powers control.

Paper is not a substitute for wool; it may be used to a small extent to dilute wool in times of stress, but even the Germans hardly claim that this can be done on any but an insignificant scale.

Since the enemy occupation of the West of Russia flax and hemp have become less and less of a difficulty to Germany, and in any case typha would appear to be the war substitute for these fibres. Paper is not a satisfactory substitute for either, and even if it were it may well be doubted whether paper will be needed to supply the place of commodities that can be grown in large quantities on land at present under the domination of the German Army.

Whether paper can ever be a satisfactory substitute for cotton is at least doubtful. It is certainly true that paper is being used largely in German cotton mills for a variety of purposes for which cotton was formerly employed, and the German newspapers constantly claim that the difficulties in the way of producing strong, water-resisting, and at the same time fine and soft materials have been overcome, and that the use of paper as a substitute has been practically perfected. At the Berlin exhibition of fibre materials held in March of this year a large assortment of paper yarn fabrics was displayed. A few extracts from the catalogue will give a good idea of their diversity:—

"Heavy paper yarns, paper twines and padding thread," "Cellulose driving belts, conveyor belts, girths," "School knapsacks, market bags, shopping bags," "Skirts, petticoats, shirts, children's clothes, boy's ready-made linen," "Men's linen, collars, shirt fronts," "Mechanics' suits, towels, scrubbing cloths," "Caps and hats for men, women and children," "Corsets," "Washing blouses," "Bracis," "Paper sailcloth substitute, paper leather substitute," and so forth.

But in spite of the constant boasts of the excellent quality of the fabrics produced, it is probable that the attempts at manufacturing fine goods have not been successful. No doubt paper yarn is serving a useful purpose in providing a substitute material for many of the articles mentioned, such as workman's coarse clothes, etc., but so far no samples have been received in this country of any of the finer goods, and until such samples have been seen and tested, it is impossible not to view the large claims of the German press with considerable scepticism. There have also been criticisms from German sources of the paper handkerchiefs and towels, etc., which are very dear and will not stand washing, and on the evidence available it seems a fair inference that the lack of cotton is at the present time a very serious hardship and handicap to our enemies, and that the control of supplies of this fibre after the war will be a valuable weapon in the hands of those who exercise it.

The case of jute is different. Although here, too, the boasts of the success with which paper substitutes for jute have met are no doubt exaggerated, and some of their defects may never be removed, there is little doubt that they have been very much improved since the war began. They have been usefully employed on a very large scale, and have solved, or at any rate greatly lessened, the difficulties that would otherwise have seriously hampered the Germans through the cutting off of their supplies of jute. Paper has achieved some measure of success as a substitute for jute, and that would seem to be its chief sphere of future utility.

THE PERIOD OF RECONSTRUCTION.

That the use of paper textiles will continue during the reconstruction period seems highly probable. It is not likely that at the close of the war there will be more than enough jute to replenish the stocks of the British and Allied manufacturers and to furnish them with quantities sufficient to last till the next crop is reaped. Even if the British Empire were to impose no restrictions on the purchase of jute for German and Austrian account, the use of jute in these countries would labour under a handicap. The landed price of jute must inevitably be abnormally high until freights have had time to recede from their present inflated level, and this price would be still further enhanced by the competition in the buying markets that must ensue if free access to them were allowed to the enemy manufacturers. In either case the need and the opportunity for the continuation of the substitute industry are manifest.

But whether the industry will survive the reconstruction period is more open to doubt, though there are at any rate some reasons for the belief that it will. The paper substitutes for jute have already improved, and it is only reasonable to suppose that further improvements will be evolved and that the inconvenience caused to our enemies by the lack of jute will grow less. Apart from this, it seems highly probable that the German Government, backed by the vested interests that

are being established, will do all in its power to foster the home industry and to establish it for all time. It should, however, be noted that the German Jute Merchants openly pronounce their fidelity to jute. In an article by the President of the War Committee of the Jute Merchants' Association it was stated that paper material will at best remain a poor substitute for the jute product. The article urged the necessity, from the German point of view, of considering, "by all available means, the unimpeded import of jute, jute material, and jute sacks." The opposition to the establishment of a large paper fabric industry in Germany may be illustrated by a memorandum from the Vereinigte Glantzstoffabriken, published in the "Berliner Tageblatt" of 8th August. This Association, which is chiefly interested in yarn made directly from cellulose warns the public against forming unduly optimistic expectations with reference to the possibilities of paper textiles, and states :—

Staple fibre, like artificial silk, is manufactured by means of a very complicated, long, and elaborate mechanical process, which requires long experience and involves very great difficulties for the factories which undertake it. It is, therefore, quite out of the question that hundreds of textile concerns should undertake the production of staple fibre, as widely suggested in the press. The granting of licences and erection of machinery would by no means be sufficient to make such extended production possible. Manufacturers who undertook the production of staple fibre would have to go through all the difficulties which the existing factories have overcome in the course of decades, and which the exertions of experienced specialists have taught them to avoid by means of improvements and special methods. The public cannot be too urgently warned to refrain from strengthening the demand for the granting of licences.

THE GENERAL UTILITY OF PAPER TEXTILES.

Seeing the extensive use to which Germany is putting her paper fabrics, and the prospects that the industry may have of flourishing after the war, the question arises whether these textile substitutes may have any value for the British Empire either now or hereafter. So far as their use in war-time is concerned, it would appear that they can have little value for us. In spite of tonnage difficulties, there is no need for us to replace our ordinary textile materials, especially as paper pulp also would need to be imported. To adapt our existing machinery to deal with paper would be a costly process, and it would take many months before the transformation could be effected on a scale large enough to make any appreciable difference. As a war measure, then, the use of paper textiles does not offer any great attractions to us.

The importance of the substitute lies rather in the possibility that they may conceivably be improved and eventually developed into a menace to established British textile trades. For some purposes, indeed, the substitutes are already suitable, and it may be said that this menace even now exists. If, owing to dear freight, or other causes, the price of our raw materials rules high for some time after the war, an impetus might be given to the introduction of paper textile manufacture in neutral and allied countries. The cost of production is obviously of very great importance, and there seems to be no reason why after the war wood pulp should not be produced cheaply. But even if the greater cost of true textiles should turn attention more and more to substitutes made from wood pulp, we need be under no great anxiety. We can use paper textiles if driven to it, and the timber resources of the British Empire are at least as great as those of the Central Powers.

ASSISTANCE TO BOMBAY INDUSTRIES.

The following statement was made in reply to a question at a recent meeting of the Bombay Legislative Council :—

(1) No financial assistance has been given by Government to the Indian Institute of Science during the years 1914 to 1918. In 1916 the institute applied for a grant (non-recurring) of Rs. 50,000 and a recurring grant of Rs. 9,000 in connection with the development of the fat and oil industries. Subsequently the director of the institute, reported that, owing to lack of essential plant the scheme could not be proceeded with. Government have received no future communication on the subject.

(2) In 1901 the Gûjra Islam Match Factory was granted the sole supply of a particular kind of wood from certain Government forests at concession rates, and was also given a lease of land at favourable rates for a plantation of trees suitable for the trade. These concessions have been continued up to the current year.

(3) In 1917 Government sanctioned the grant of a supply of wood to the manager of the Southern Maratha Tile Works, Belgaum. In the same year a similiar grant was made to the manager, Pioneer Clay Works, Belgaum.

(4) In 1917 the Eastern Trading Company applied for exemption from the payment of duty on the salt required by it for the manufacture of bleaching powder and caustic soda. The Company was informed that further application should be made when a site had been selected and the plans of the Company had matured.

(5) In the same year, Messrs. Kiroskar Brothers, manufacturers of agricultural implements, applied for what amounted to the grant of a monopoly for the supply of ploughs to the Agricultural Department. They were informed that the Agricultural Department would arrange for the disposal of as many of their implements as possible, but that no undertaking could be given that ploughs, etc, would not be purchased from other firms.

(6) In 1917, a manufacturer of hand-looms at Sholapur applied for a loan of Rs. 5,000 for the extension of his business. Government were unable to grant the reqnest pending a decision of the general question of the grant of direct financial assistance to industries.

(7) In 1917 the Indigenous Industries Committee made certain proposals to Government for the development of the Rosha Oil Industry. Government have given assistance to the contractors by helping in the supply of certain plant and by the grant of a monopoly for the collection of grass in certain forest areas.

(8) In 1918 the Salsette Chemical Company applied for assistance is the importation of plant required for their operations. Government replied that it was not possible to give this particular form of assistance, and that if assistance of any other kind was required, the director of industries should be referred to.

(9) In addition to ~~the~~ above, during the past few years, Government have, on application, given assistance to various industries by the grant of land at favourable rates. Permission has been given to tap sweet toddy free of tax for the manufacture of gul, and the excise duty on denatured spirit of local manufacture has been removed. At the present moment the question of making considerable grants of timber for shipbuilding purposes is under consideration.

INDUSTRIES AFTER THE WAR.

In 1916 the Board of Trade appointed four Departmental Committees to consider respectively the position of the iron and steel, engineering, electrical, and textile trades after the war, especially in relation to international competition and to report what measures, if any, are necessary or desirable in order to safeguard that position. The chairmen of the several committees were: *Iron and Steel*—Mr. G. Scoby-Smith; *Engineering*—Sir Clarendon Golding Hyde; *Electrical*—the Hon. Sir Charles A. Parsons, K. C. B., F. R. S; *Textile*—Sir Henry Birchenough, K. C. M. G. All the committees finished their work by the middle of the following year, but their reports were not presented to Parliament until towards the close of last Session. They have since been issued to the public.

I.—Iron and Steel.

The Iron and Steel Trades Committee say that the problem of which they have attempted to reach a solution is to give the nation industrial resources which in time of peace shall preserve the prosperity of Great Britain, and in time of war give her full command of resources adequate to the defence and safe-keeping of the Empire. The committee specially refer to the rapid development of these two industries, which they describe as one of the most striking features of the economic history of the nineteenth century, and to the revolution caused by the discovery of the Thomas (Basic Bessemer) process. It was only in or about 1880 when the Thomas process was applied to the open hearth furnace, that basic steel attained comparative equalify with acid steel, and not until ten years later that the admiralty and Lloyd's permitted the former to be used in shipbuilding. The manufacture of steel in the electric furnace is still in its infancy, but the process is gradually extending for the manufacture of high-grade steel and for the production of castings of special quality, and there is every reason to anticipate that steel so produced from domestic raw materials will, to a great extent, replace the steel formerly manufactured from imported Swedish iron and steel in the specialised manufactures of the country. While as regards the iron foundry industry there have been no "epoch-making discoveries," there is a record of steady progress in foundry practice and

of improvement in the quality of the product as well as an advance in the scientific education of those engaged in the industry.

The scope of the inquiry being very wide, the committee treated the numerous subjects separately, and from time to time made interim reports to the President of the Board of Trade. These are reproduced in the general report, the names of the signatories, with or without reservation, being appended to each. The summary of recommendations is grouped under various headings. Altogether there are sixty-one recommendations. The first six deal with commercial reconstruction, and are as follows: (1) That all imports of manufactured or semi-manufactured products of iron and steel from present enemy countries be prohibited during the period of reconstruction; (2) that all ores and minerals necessary for the manufacture of iron and steel be admitted free, and all other materials necessary for the manufacture of iron and steel be admitted only in their natural or unworked state; (3) that no raw materials be sent to present enemy countries from British Dominions or Colonies, or from mineral or other resources under British control; (4) that British ships shall not carry raw materials or manufactured iron and steel from neutral ports to ports in present enemy countries or to neutral ports for ultimate despatch to enemy countries; (5) that careful Government consideration be given to the question as to whether the ships of present enemy countries shall be allowed to carry goods to or from ports in the British Empire; (6) that licences be granted in cases where national interests demand the relaxation of the regulations recommended above, and that a fully representative committee of the iron and steel industries be appointed to regulate the issue of such licences where they directly affect the industries.

The other recommendations include the following: That an organization be formed comprising users of iron ore, and others interested in and essential to the conduct of the trade, to undertake the import and distribution of foreign ores in Great Britain and acquire interests in ore properties abroad, and that such organization should receive Government financial assistance if necessary; that no mining concessions within the Empire be granted to any alien individual or company without Government sanction, and that the Dominions be urged to adopt a similar policy; that an adequate economic survey be made of the natural resources of Great Britain and other parts of the Empire; that iron and steel manufacturers associate themselves for the purposes of export trade, and form common selling organizations by the extension and consolidation of associations which already exist; that an organization—co-operative in character—be formed among British manufacturers for the purpose of obtaining adequate supplies of suitable iron ore; that a national selling organization be formed for the purpose of marketing British iron and steel products in an efficient and economical manner, and that British iron and steel manufacturers be urged to form combinations for the purpose of laying down large and well-designed new units for cheap production upon modern lines.

Recommendations respecting labour relations, protection, royalties and wayleaves, means of transport, technical education, etc., follow.

Finally, general subsidiary questions are dealt with, and in this connection the committee recommend, *inter alia*, that where permission is given by H. M. Government for the raising of loans in the United Kingdom this permission be conditional upon the purchase of as much of the material required as possible in the United Kingdom, and that all purchases of iron or steel made by or for Government Departments, public bodies, railways, etc., within the United Kingdom shall be of British manufacture.

HOLKAR STATE INDUSTRIES.

Mr. M. V. Kibe in his third annual address to the Holkar State Industries Committee, held on 11th December last, spoke at length on the progress made in the State. He said :—

According to our usual custom we are meeting to-day at our annual function. Occasions like these give us an opportunity to review our work and to form our programme. For the first time last year, more than one meeting was held. I hope that meetings would be more frequent in the future.

The year which has passed has been of great importance to the department both in its losses and achievements. I have to record with deep regret the death of the two members of this Committee. The first to occur was that of Mr. S. R. Dube. His work is too well-known to you to need any deleniation by me. In him I have lost a subordinate who was of the greatest help to me both in the present and the prospect. He was followed by Sardar S. R. Vinchurkar, latterly Subha of Nemad. He also took much interest in our work and was keen on finding opportunities for it. These two losses, the transfer of Mr. N. V. Phadke, to another office on promotion and the continued

vacancies in the posts of the Secretary for Commerce and Industry and the Secretary for Chamber of Commerce have been a weighty handicap on this department.

On the other hand I acknowledge the liberal help received by me from the higher quarters which enables me to lay before you a substantial account of work done. About a year and half ago, I had published a progress report of this department in which I had enumerated some specific schemes and had asked for some modification of the organization of the department. While no progress has been made in the latter direction, it is gratifying to find that the former, which could have very well taken a longer time, have been almost accomplished.

During a year and a half, the State has been pretty liberal in making grants for industrial progress. The first and the foremost in its significance is the grant of Rs. 5,500 placed at my disposal by His Highness the Maharaja, for investigation into and preliminary expenses for industries. This has been hitherto utilised less in capital expenditure than in advances, so as to utilise it as a permanent advance as far as possible. The other grants or loans, are enumerated below :—

Rs. 5,000 Hosiery Factory.
,, 20,000 Rotary Engines.
,, 20,000 Wall-Tile Works.
,, 50,000 House-Building Board.
,, 20,000 Thymol Works.
,, 20,000 Glass Factory.
,, 90,000 Paper Factory.
,, 16,000 Administrative sanction for a laboratory.

Proposals made for assisting a Cenema company, mainly devoted to educational films, an electric Workshop and a button factory have been held over for financial reasons. For similar reasons, the department has yet made no proposals regarding assistance to hand loom weavers at Rampura, Soap makers, a Coach factory, and two fine artisans who make enamalled ornamental wares. There are many other proposals tending to assist small industries which for the reasons already given, could not be hitherto entertained. It will be convenient for the department if a specific sum is annually placed at its disposal to promote such projects.

It is a criterion of the soundness of an undertaking that it should expand. Applying this test to the two concerns which on the assistance received from the State have carried on their work that they both claim for further funds to meet the requirements of their customers. While the hosiery factory has been regularly repaying its loan by the instalments fixed, in spite of the devestating influenza epidemic, the Director General of the Indian Medical Services has given the following testimonial to the product of the Thymol Factory.

> "The sample of the thymol submitted by you was examined and found to conform in many respects to the standard required by the British Pharmacopia."

With a view to assist industries the duty on the import of coal has been abolished for the next seven years. The revision of the Tariff is under consideration in this connection.

Among the new projects that have been undertaken the foremost place is occupied by the appointment of Professor H. S. Jevons, Professor of Economics in the University of Allahabad, as the Economic Adviser to the State for a specified period. He has undertaken a thorough study of the economic development of the State and in the fullness of time the result of his labours and advice will be seen.

Professor P. Geddes, the town planning expert, has drawn up a plan for an industrial town, which will concentrate, co-ordinate and develop industries in the City of Indore.

One of the greatest and urgent needs is a broad guage line. A scheme for it is being pushed forward and it is hoped that now that the War is over, one will be made at no distant date.

A cheap power is another necessity of industries. A scheme is under investigation, which while utilising such hydro-electric power as may be available, and for which investigation is actively going on, would make adequate electric power available for the present and future mechanical industries.

In connection with the project of levying a small super tax by means of the railways which has almost matured, a scheme for the development of the communications in the State and the neighbouring Country is being prepared. It will develop old ones and create new centres of trade, besides conferring other benefits on the trade.

The mineral resources of the State are receiving attention. Request for permission to prospect have been received from outside. Negotiations for working and mining certain ores have already far advanced. The attention of the local capitalist has not been drawn to these matters. The department can only try to find opportnuities for the investment of their capital.

A proposal for the development of funds for the promotion of industries and general economic progress is receiving consideration and your opinions on it individually have been invited. A new annual income of over half a million will be made available for its purposes. Part of it has already accrued to the State during the last two years and proposals for the rest are maturing.

These proposals though meeting to some extent the need of a loan agency, cannot take the place of an industrial Bank. Much mis-conception prevails on the subject of a Bank. That one is a necessity for industries is undoubted but the subject is so shrouded in wrong ideas, that it cannot be dealt with at this place. The department is endeavouring to shortly meet this want.

But the feature, most gratifying to me, is the response we are meeting with from the people. Within the last two months two new companies have been formed with a capital amounting to Rs. 5,00,000. This includes the expansion of the private iron foundry to which reference was made in my last address. The Brush Factory requires more funds for its working. A Commercial and Industrial Bureau has been formed. A tannery on a big scale is projected by the Chemical Engineer, who has the work of the Paper Factory well in hand. The Geological Officer, who is looking after the Glass Factory, promises an economic Geology of the State and pottery works before June next. Several small industrial establishments have been started by the people and by the philanthropic merchants of the City. In the absence of an Act to register such associations, for which proposals have beeu made, such concerns stand in dauger of dying a premature death.

I feel that in general very little is being done by the State by way of guiding and educating the people in trade and industries. The Chamber of Commerce has not yet been established. The project for a Technical School has not yet borne fruit. In this connection I append to this address a note drawn by me regarding the Industrial institutions started by the U. P. Government. It is disheartening to find that while the Mysore Government has taken up the idea of spreading the use of labour-saving machinery by establishing repairs shops in the country and appointing advisers in mechanical engineering, it has not attracted any attention here.

But the department with its limited means has not been quite negligent of its duty of spreading sound ideas and knowledge of trade and industries. It has collected a small museum of things made in the State. Reciprocity in the matter of publications has been established with corresponding departments of the Government of India, Provincial Governments and Native States. A few publications in the shape of bulletins, leaflets, and press notes have been issued. At the last meeting of the Committee a proposal to establish its branches in the districts was approved and has been forwarded for sanction. I would ask the Committee to consider the question of adding non-official members to it. A library of standard works and current literature is being formed. The commercial class has, mainly through the exertions of Mr. K. M. Banthia, B. Sc., B. Com., to whom I am grateful for it, continues to exist. Last year three students received its certificates. The department has now so far developed as to have a publication of its own. I wish to acknowledge the help which I have received from the editorial staff of the Malhari Martand Vijaya, despite its recent ill-informed criticism, in the matter of the publication of the news and views of the department. A great stimulus to the publication department may be had from the electrification of the State Press, which has been recently accomplished.

At the last meeting of the Committee the proposals for holding an industrial exhibition and inviting a session of the Indian Industrial Conference were approved of and the questions were referred to a sub-committee. It has made its report which is under the consideration of the Government. The late influenza epidemic may adversely affect its prospects in the near future.

For the fuller development of commerce bonded warehouses at important railway stations, especially those on the borders of foreign states, will be highly useful. If a company were established for the purpose it may be assured of a good return on its capital.

The work of encouraging local as well as Indian industries would be greatly facilitated if a stores department, like the stationery stores, is created. In the latter as far as practicable such things were purchased, and the policy, it is hoped, will be continued.

The idea of appointing a special Forest exploitation officer has been taken up by the Governments of Mysore, Travancore and Cochin, with very beneficial results. British India fights shy of it and no progress has been made here. The Conservator of Forests, whose grass operations have made a name for him in India, takes keen interest in the matter and has lately sent in three reports describing certain experiments, which are available for your information.

The experience gained in the last two years has disclosed many needs, which are attempted to be met. A large sugar factory is under contemplation. Proposals for developing the scope of the distillery for making refined spirits have been made. A big Oil Pressing Mill can very well come into existence and negotiations for it are in progress. A metal factory is desired to be established. It is pleasing to note that applications for advice in the matter of starting new industries in the districts have begun to come.

Indore is a big market place for cotton. Owing to the stopping of the unrestricted cultivation of opium, cotton has become the next important commodity. Much speculation goes on in it. The raising of prices by its means detrimentally, affects the prospects of the Mill Industry at this centre. The matter has been investigated into and proposals for its control have been made.

With the starting of new joint-stock companies, and the participation of the people in the shares of outside companies, a share market is becoming a necessity. The publication of quotations of the local and some of foreign companies begun by the department will stimulate interest in the subject.

I have received the usual help from my staff which owing to diminution among its members and increased pressure of work on account of the famine and epidemic had to work harder than last year. It would be invidious to mention any names but Mr. V. G. Apte's name, whose services have been loaned to this department, may be mentioned. I am grateful to the Honorary Workers who have very kindly helped this department.

MYSORE ECONOMIC CONFERENCE AGRICULTURAL COMMITTEE.

Brief report of work done since September, 1918.

1. *Introductory* :—During the period under report activities were handicapped by the influenza epidemic, but current work received attention, and fair progress was also maintained on the schemes under operation.

2. *Fruit Culture* :—Detailed proposals were submitted to Government on the formation of District nurseries as a necessary first step for stimulating fruit gardening on a really large scale. The Committee were of opinion that private initiative should be encouraged as far as possible. A large demand for fruit plants has been created and it is quite necessary that local sources of supply should be organized to take advantage of it. A central nursery labours under obvious disabilities resulting from cost and difficulties of transport. An enterprising gentleman of Shimoga, Mr. Basappa of Holehanswadi, has offered to raise a nursery on his lands situated on the Banks of the Tunga not far from the District Head-quarters. Mr. Veene Rangaswami Iyengar of Seringapatam, a member of the Committee, has offered to start a similar nursery for the Mysore District. Recommendations have just been received regarding the loan of the services of an experienced mali to the Agent of the Murgi Matt, Chitaldrug, who proposes to start a nursery for that District. These proposals will be worked up and definite recommendations submitted to Government.

A book on fruit culture written by Mr. M. Subbayya, B.A., with special reference to local conditions has been published under the auspices of the Committee and has been made available for sale, through the agency of the District Committees.

A school for training malis has been sanctioned by Government at the instance of the Committee and steps are being taken to organize it and secure candidates for all districts.

3. *Live-stock* :—The Sheep Farm at Pilligana-halli (Gottagere) has been organized and our animals have been taken there. The institution has evoked much interest in the locality. The experiment with the Baluchi Dumbas has shown that they are hard to acclimatise, being very susceptible to changes of air and pasture and that we shall probably have to look elsewhere for a cross strain. The experience with the Merino has, on the other hand, been encouraging and very promising young stock of mixed blood has been obtained.

The concessions recently sanctioned for the benefit of breeders have aroused a doubt in the minds of some officers as to whether these rules operate in supersession of the old rules regarding the supply of Amrut Mahal Bulls at concession rates, or whether they only supplement them. The subject is before the Committee for consideration.

4. *Increase of Food Production* :—The recommendation of the Committee for securing increased production by facilitating disposal of darkhasts and encouraging temporary cultivation of lands hitherto reserved from the plough, have been approved and embodied in Government orders. It has been ascertained from the Amrut Mahal Department that nearly 11,000 acres of land have been made available to the Revenue Department.

Continued touch is being maintained with the Central Foodstuffs Board at Delhi, as directed by Government.

5. *Agricultural Organization* :—The note drawn up laying down the constitution and the functions of Taluk Agricultural Associations is before the Committee for consideration. While agreeing with the views of the various District Committees that there is need for expansion of the Agricultural Department, the Committee consider that the paucity of staff makes practical action impossible at present.

6. *Statistics* :—Forms for the compilation of statistics of agricultural production have been prepared with a view to take stock of progress from year to year. A form intended to forecast agricultural development in extent as well as in quality has been approved by the Sub-Committee dealing with the subject.

7. *Development of Commercial Crops* :—Notes on facilities for developing sugar-cane and pepper cultivation by members of the Committee are under consideration. The introduction of indigo culture and manufacture on a commercial scale is under study.

8. *Agricultural Education* :—The scheme prepared by the Inspector-General of Education regarding the development of Agricultural Education by introducing agriculture, in the first instance, at thirty Anglo-Vernacular Schools in the State is under consideration along with suggestions received on the subject from members of the Committee.

N. RAMA RAO,
Secretary.

BOOKS IN BRIEF.

Towards Industrial Freedom. *By Edward Carpenter. George Allen and Unwin Ltd., London. 3s. 6d. net.*

Edward Carpenter is an idealist and as such is always a brilliant and fascinating writer to read. In this volume, which is for the most part made up of papers written before the War, he discusses with his usual versatility and suggestiveness problems as widely apart as the transformation of the British industrial system and the British Aristocracy and the House of Lords. Throughout the pages of the volume, however, there runs the same practical idealism that has marked as much his writings as his life itself. It is impossible to read this volume—as indeed any that Carpenter has produced—without feeling that he is the best type of what he describes as *spiritual* Socialism. "It becomes increasingly evident I think," he says, "that over and beyond any formulæ of reform what is needed is a *new spirit* of social and industrial life. Without that even the best institutions will be of little avail." And what is this spiritual Socialism? "This spiritual freedom means," he adds, "the opportunity to evolve from oneself what one thinks right and beautiful. It means a co-operation of all the members of Society, and this in a way not merely technical and external, but in a real spirit of mutual help and equality. Only on such conditions, we may be sure—only on the condition of spiritual and creative freedom—can a society be really human and healthy." He illustrates his point by adding a chapter on Chinese life, in which he compares its simplicity and spirituality with the conditions prevailing in Western countries. Campbell has illustrated in his own life the need for increasing agricultural produce; his *theory* has been demonstrated to be something more than a mere dictum. The War has shown how England has suffered by the neglect of agriculture that she suffered to continue during the past century. Campbell believes in small holdings and holds that a nation that calculates its prosperity on the length of its rent roll is not even a civilized one. This may look an extreme doctrine but is grounded in conviction so far as he is concerned. His comparison between China and England in this matter is rather worth quoting to show how he views this question. "In China," he writes, "it is thought rather disgraceful to live on the rent of land. There is no law, as I understand, against it, but there is a strong public opinion and though, as a matter of convenience, it is not uncommon for one small holder who has more than he wants to rent out an acre or two to another who has less, it is rarely for any one to attempt or dare to live entirely from the tribute of his tenants. In England, I need hardly remark, it is just the opposite; there is a common public opinion in the other direction, and a man is respected, and even thinks himself respectable, just in proportion to the rent-roll. Apart then from all legislation, one can see in these two instances the vastly differing results of a differing spirit of life—in China an immense peasant class rooted comfortably in small tenures on the land, the most productive and the most stable on the whole Earth, and in England huge private estates half cultivated by a paralysed and insufficient population, and a country in perpetual danger on account of the inadequacy of its food-supply." One who writes thus cannot but be an admirer of small holdings and agricultural co-operation. "In my experience," he writes, "small holders are among the best and most capable of our rural populations." (He includes as small holders those who work farms up to forty acres or so). "They generally exhibit," he adds, "a good deal of all-round capacity, and are versatile and handy at a variety of jobs. And this for the simple reason that having to look after a small place mainly by themselves they are *obliged* to be a little ingenious and versatile." He would transfer the main portion of the common lands into public hands by a statutory enactment; and he would also by another measure compel owners in the future to declare their land values, and enable public bodies to purchase on the basis of the values so declared. These two measures, in his opinion, would bring "the land of the nation into the possession of its rightful owners." That something of this sort is being brought into existence as one of the results of the War few can deny in the light of what is actually happening to-day in England. Carpenter may be a *dreamer*—and he has been described as such—but that he has dreamed aright in certain directions there can be no denying. This book is full of the suggestive writing that readers have long associated with Carpenter's name. Good wine needs no bush and Carpenter's writings do not need any commendation at our hands.

The Renaissance in India and New Ways in English Literature.—*By J. H. Cousins. Published by Messrs. Ganesh & Co. Madras.*

Our excuse in reviewing these books by Mr. Cousins in this *Journal* is that they are something beyond the merely *literary* criticism that we usually get in volumes of this kind. Mr. Cousins is a gifted poet; a writer with a style; and no mean critic.

Besides, he has in his life time apparently come across some literary personages of eminence. His impressions of these he records in these volumes and these alone would make them highly valuable. One such person of worth is Edward Carpenter of whom we have written above. Mr. Carpenter is described by Mr. Cousins in the second of the two books noted above. His word picture of the old Socialist seer is a brilliant one. It is one that every one who wants to know something of the causes which have made Carpenter what he is should read it for himself. For ourselves we have read much *by* Carpenter but little *of* him. This is the first time we have had anything like a satisfactory account of the man and the influences that have made him what he is to-day. Some body called Carpenter a "dreamer"; whether he or his critic is the real dreamer can be easily understood by any one who reads Mr. Cousins' essay. To the student of Economics, this essay, by the way, will prove of peculiar interest. We know that there are phases of thought far too characteristically Eastern (or rather Indian and Upanishadic) to be perceived in a twentieth century Western thinker like Carpenter. Until we read Mr. Cousins we had no idea that Carpenter had studied and profited from the *Gita*. We think we have written enough though only on one aspect of Mr. Cousins' writings to show their real worth. We think no one who reads Mr. Cousins will ever lose an opportunity of renewing his acquaintance with him. He is a most delightful writer and it is a pleasure to read him. We do not think we need say more in commendation of him or his wirtings.

The Co-operative Movement. *By V. Venkatasubbiya and V. L. Mehta. Published by the Servants of India Society, Allahabad.*

This is a clearly written book and as such deserves to be widely read. In the first part, Mr. Venkatasubbaiya discusses the general principles of co-operative movement in European countries and India. In the second part, Mr. Mehta deals with the different forms of Co-operation known to India—Agricultural Credit Societies, Non-agricultural Societies, Non-credit co-operation, etc. He has also chapters on Central Societies and Banks, State aid and control and organization, supervision and audit. We have given these details to show the comprehensive character of this book. It is throughout written with care and the figures are up-to-dtae and accurate. We would glady see the book attain the popularity that it so richly deserves.

How to Pay for the War.—*By Harold Hamel Smith, Editor, 'Tropical Life.' Published by John Bale, Sons and Danielsson, Ltd., Oxford House, London, W. 1.*

Mr. Hamel Smith is not unknown to our readers. His contributions to this *Journal*—which have been, by the way, extracted in this book—should have made him fairly familiar to them. He is so fertile a writer and so suggestive in his schemes that anything he writes about ought to appeal to a large number of thinking men all over the tropical world. Mr. Smith in this book has ventured to show on what lines the latent resources of the Empire can best be developed and how such development can aid the Empire as much as England herself. Mr. Smith does not expect every one to agree with him but he certainly expects a fair hearing. We know that he will secure this despite the unpopularity of his views. We do not propose to go into the details of his book for that would be unjust not so much to Mr. Smith as to his publishers, for they have a right to get full value for their expenditure on it, especially in those days of paper famine. But we must, we feel, refer to one or two points touched upon in it. One is the important place assigned to it by him for India. His chapter on "Develop India" is a reprint of his article in this *Journal*. It is a thoroughly sane one. Another subject he discusses is why we should prevent Germany obtaining the bulk of her wealth by being carried on the back of the British Empire. A still another topic that Mr. Smith discourses on is why we must increase the output per worker per annum and also per acre in use by employing up-to-date measures and machinery. Mr. Smith's book is, as usual, thoroughly readable and we have no doubt it will be appreciated everywhere in the tropics for its suggestiveness and sanity.

The Expansion of British India. 1818-1858. *By G. Anderson, M. A. and Mr. Subedar, B.A., B.Sc., F.R.S.E. Published by G. Bell & Sons, Bombay and London. Price 4s. 6d. net.*

This is a most laudable attempt to get the student accustomed to the first authorities on Indian history. It is what is popularly termed a "Source Book." On the whole the authors have done their work with scrupulous care and attention. The period dealt with is a most important one and is dealt with in a thoroughly comprehensive spirit. Perhaps the value of a publication of this kind would be enhanced a great deal more if the authors went straight to the fountain heads rather than to the distributories. This may not be always easy but while at it, it seems right to seriously attempt it. We would strongly commend the book to the attention of our University Board of Studies. We await with interest the future volumes of this series.

The Business of Finance. *By Hartley Withers. Published by John Murray. 6s. net.*

This is a most suggestive book by Mr. Hartley Withers. He writes with his usual vivacity, and this is the best recommendation that a book on finance can ever want. It is what such a book is usually *not*. There is no crude sentimentality in it; rather many old shibboleths are pricked through by Mr. Withers by the piquancy of his criticism. We shall only refer to one point which he refers to in his book to indicate the perspicacity that is so much usually in evidence in Mr. Withers' writings. In the chapter on "the manufacture and marketing of Securities", Mr. Withers has a word or two on preference and preference Securities. These are wise words and those interested in them ought to lay his words to their hearts. We would also refer before we conclude to his very luminous remarks on international currency and investment abroad. They will amply repay perusal. We cannot, we think, better sum up his book than in his own brief words. He says: "I have tried to show how important it is that the machinery of finance should be kept clean and handled by men with clean hands and minds, fitted always with the wish to use it for the improvement of man's lot, and the expansion of his power over the forces of nature. Many difficulties have been shown to be in the way of the fulfilment of this ideal, most of which we seen to arise out of the ignorance and greed of an economically uneducated public, which continually invites sharks to prey on it, and then blames finance, and those who try to work it honestly, because its invitation is accepted."

Making Advertising Pay. *By Harold F. Eldridge. Advertising Manager, "The State." Columbia, S. C. Published by the Author.*

"The study of advertising, says Mr. Eldridge in the preface to this book, "from an economic and social standpoint reveals the fact that when properly directed it becomes a force which benefits both the advertised and the consumer of advertised goods, justifying its economic existence by the service it renders to both." These are wise words and are the results of his wide experience in the advertising line. The present reviewer has been long connected in the management of newspaper offices and he can say that much of the advertising that is in done in this country—apparently it is so even in the far away Western country from where Mr. Eldridge writes—hardly ever bears the fruit it should; if well directed why should this be so? That question Mr. Eldridge answers in this book from his close acquaintance with practical advertising. His conclusion that advertising will not pay unless it is clearly understood what it is. There is not, in his opinion, is that appreciation of the true function of advertising as there should be. This diagnosis is, we think, correct. If there were some clear idea of its true value, there would be less waste of it. Mr. Eldridge writes with wide knowledge of advertisers and advertisements, and enhances the value of his book by basing it mainly on records of actual accomplishments and experiences. This is as it should be. To those interested in advertising in this country—and they ought to increase with the coming of peace—we would strongly recommend a careful study of this book. It is scientifically cast and treats of the fundamental principles of advertising in a manner which leaves nothing to be desired.

India under Experiment. *By George M. Chesney. Published by John Murray. 5s. net.*

This is a critical examination of the Government scheme of political reform in India. Mr. Chesney was for long Editor of the well-known newspaper *The Pioneer*. His views, though more destructive than constructive, ought to command wide attention. It is often advantageous to know what your opponents think of your proposals and in that light Mr. Chesney's criticism will lose none of its weight because it is either too vigorous or pungent. Few of those who knew Mr. Chesney in India would ever have thought that he would develop so much pugnacity as he betrays in this book of his, but as has been well remarked the busy newspaper man is the best type of fighting politician the world knows. Mr. Chesney's criticism we do not propose either to detail or examine here for the reason that it is likely to lose its force in retailing. Every one should read the book for himself to judge of its merits.

In the article on "Co-operation in Bombay" in the October (1918) issue of this *Journal*, the report considered was the one for 1916—1917 and not that for 1917-18 as appeared in the head note to it. In the same article on page 617 col. 1., line 10, the word "but" should be "not"; on p. 169, Col. 2, line 9 the word "pushed" should be "has had" on p. 620, Col. 1, line 39, the word "instructive"; should be "initiative"; and on p. 621, Col. 1., line 40, the word "drawing" should be "driving." We would thank our readers to note these printers' errors in their copies.

ACKNOWLEDGMENTS.

Report on the Administration of Mysore for the year 1917-18. *Bangalore. Printed at the Government Press. 1918. Price One Rupee.*

Some Scale Insect Pests of Coffee in South India. *By Leslie C. Coleman, M.A., Ph.D., and K. Kunhi Kannan, M.A., F.E.S. Department of Agriculture, Mysore State. 1918. Price One Rupee.*

Proceedings of the Eighth Conference of Registrars of Co-operative Societies. *With Appendix. Printed at the Government Monotype Press, Simla. 1918.*

Kheti and Sahakarya Trimasik. *Baroda.—Department of Commerce. Baroda State.*

RECENT PUBLICATIONS.

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The Trust Problem. *By Jeremiah Whipple Jenks, Research Professor of Government business New York University. Fourth Edition. Enlarged and completely revised. With the Collaboration of Walter E. Clark, Professor of Economics, College of the City of New York, President of the University of Nevada. $8\frac{1}{4}\times5\frac{1}{4}$, vii, + 499 pp. Putnams. 10s. 6d. n.*

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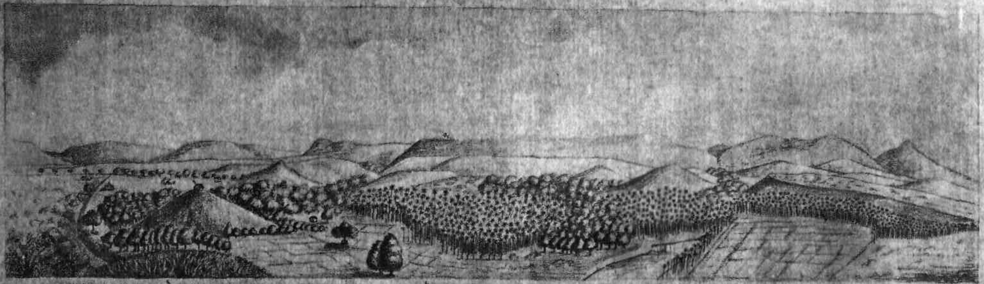
Comparative Education. *Studies of the Educational Systems of Six Modern Nations. By H. W. Foght, A. H. Hope, I. L. Kandel, W. Russel, Peter Sandford. $8\frac{3}{4}\times5\frac{1}{4}$, x. + 500 pp. J. M. Dent, 8s. 6d. n.*

Human Nature and its Remaking. *By William Ernest Hocking. 9×6, xiv. + 434 pp. Humphrey Milford. 12s. 6d. n.*

The Industrial League Journal. No. 1. Vol. 1. *September, 1918. 10×8. 12 pp. The Industrial League. 6d.*



VIEW LOOKING EASTWARDS FROM 150 FEET HIGH FLAT TOP SPUR
NEAR BHATKAL SEA SHORE.